SOLICITATION, OFFER AND AWARD

1. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 700)	RATING	PAGE 1 OF PAGES 47

2. CONTRACT NO.	3. SOLICITATION NO.	4. TYPE OF SOLICITATION	5. DATE ISSUED	6. REQUISITION/PURCHASE NO.
	N65540-06-R-0013	[ ] SEALED BID (IFB) [X] NEGOTIATED (RFP)	30 May 2006	

7. ISSUED BY	CODE	8. ADDRESS OFFER TO (If other than Item 7)	CODE
NAVAL SURFACE WARFARE CENTER, CARDEROCK CODE 3352, MATTHEW DREBY 5001 SOUTH BROAD ST. PHILADELPHIA PA 19112-5083 TEL: 215-897-8434 FAX: 215-897-7059	N65540	**See Item 7** TEL: FAX:	

NOTE: In sealed bid solicitations "offer" and "offeror" mean "bid" and "bidder".

SOLICITATION

9. Sealed offers in original and 1 copies for furnishing the supplies or services in the Schedule will be received at the place specified in Item 8, or if handcarried, in the depository located in Building 4 Code 3352 until 04:00 PM (Hour) local time 29 Jun 2006 (Date)

CAUTION - LATE Submissions, Modifications, and Withdrawals: See Section L, Provision No. 52.214-7 or 52.215-1. All offers are subject to all terms and conditions contained in this solicitation.

10. FOR INFORMATION CALL:	A. NAME	B. TELEPHONE (Include area code) (NO COLLECT CALLS)	C. E-MAIL ADDRESS
	MATHEW J. DREBY	215-897-8434	matthew.dreby@navy.mil

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OFFER (Must be fully completed by offeror)

NOTE: Item 12 does not apply if the solicitation includes the provisions at 52.214-16, Minimum Bid Acceptance Period.

12. In compliance with the above, the undersigned agrees, if this offer is accepted within _____ calendar days (60 calendar days unless a different period is inserted by the offeror) from the date for receipt of offers specified above, to furnish any or all items upon which prices are offered at the price set opposite each item, delivered at the designated point(s), within the time specified in the schedule.

13. DISCOUNT FOR PROMPT PAYMENT (See Section I, Clause No. 52.232-8)	

14. ACKNOWLEDGMENT OF AMENDMENTS (The offeror acknowledges receipt of amendments to the SOLICITATION for offerors and related documents numbered and dated):	AMENDMENT NO.	DATE	AMENDMENT NO.	DATE

15A. NAME AND ADDRESS OF OFFEROR	CODE	FACILITY	16. NAME AND TITLE OF PERSON AUTHORIZED TO SIGN OFFER (Type or print)

15B. TELEPHONE NO (Include area code)	15C. CHECK IF REMITTANCE ADDRESS IS DIFFERENT FROM ABOVE - ENTER SUCH ADDRESS IN SCHEDULE.	17. SIGNATURE	18. OFFER DATE
	☐		

AWARD (To be completed by Government)

19. ACCEPTED AS TO ITEMS NUMBERED	20. AMOUNT	21. ACCOUNTING AND APPROPRIATION

22. AUTHORITY FOR USING OTHER THAN FULL AND OPEN COMPETITION: ☐ 10 U.S.C. 2304(c)( ) ☐ 41 U.S.C. 253(c)( )	23. SUBMIT INVOICES TO ADDRESS SHOWN IN (4 copies unless otherwise specified)	ITEM

24. ADMINISTERED BY (If other than Item 7) CODE	25. PAYMENT WILL BE MADE BY CODE

26. NAME OF CONTRACTING OFFICER (Type or print) TEL: EMAIL:	27. UNITED STATES OF AMERICA (Signature of Contracting Officer)	28. AWARD DATE

IMPORTANT - Award will be made on this Form, or on Standard Form 26, or by other authorized official written notice.

Section B - Supplies or Services and Prices

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0001			Lot		

Pre-Production Heat Pipe Bleed Aircooler
FFP
Engineering services for the redesign and fabrication of a full-scale pre-production Heat Pipe Bleed Air Cooler (HPBAC), for demonstration aboard a DDG-51 class ship.
FOB: Destination

NET AMT

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0002		1	Lot		

Technical Data For CLIN 0001 NSP*
FFP
In accordance with Exhibit A, Contract Data Requirements List (CDRL)-DD Form 1423
FOB: Destination

NET AMT

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
000201			Lot		
	Technical Data For CLIN 0001 FFP Post Analysis of Prototype FS-HPBAC, Seq. No. A001 FOB: Destination			NSP*	
				NET AMT	

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
000202			Lot		
	Technical Data For CLIN 0001 FFP Proposed plan for reuse of Prototype FS-HPBAC or proposed plan for large or small coupon evaluation, Seq. No. A002 FOB: Destination			NSP*	
				NET AMT	

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
000203			Lot		
	Technical Data For CLIN 0001 FFP Testing results of redesign or coupon, Seq. No. A003 FOB: Destination			NSP*	
				NET AMT	

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
000204			Lot		
	Technical Data For CLIN 0001 FFP Delivery redesign cooler, Seq. No. A004 FOB: Destination			NSP*	
				NET AMT	

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
000205					
	Technical Data For CLIN 0001 FFP Production cost projections of FS-HPBAC, Seq. No. A005 FOB: Destination			NSP*	
				NET AMT	

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
000206			Lot		
	Technical Data For CLIN 0001 FFP Final Report, Seq. No. A006 FOB: Destination			NSP*	
				NET AMT	

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0003			Lot		
	Pre-Production Heat Pipe Bleed Aircooler FFP Option to Fabricate a FS-HPBAC in Accordance with Section C FOB: Destination				
				NET AMT	

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0004		1	Lot		
	Technical Data For CLIN 0003 FFP In accordance with Exhibit B Contract Data Requirements List (CDRL)-DD Form 1423 FOB: Destination			NSP*	
				NET AMT	

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
000401			Lot		
	Technical Data For CLIN 0003 FFP Refine mathematical model and verified calculations for FS-HPBAC, Seq. No. B001 FOB: Destination			NSP*	
				NET AMT	

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
000402			Lot		
	Technical Data For CLIN 0003 FFP Refine structural and thermal analysis for FS-HPBAC, Seq. No. B002 FOB: Destination			NSP*	
				NET AMT	

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
000403			Lot		
	Technical Data For CLIN 0003 FFP Final redesigned FS-HPBAC drawing package, Seq. No. B003 FOB: Destination			NSP*	
				NET AMT	

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
000404			Lot		
	Technical Data For CLIN 0003 FFP Final Report, Seq. No. B004 FOB: Destination			NSP*	
				NET AMT	

Section C - Descriptions and Specifications

DESCRIPTIONS/SPECIFICATION

STATEMENT OF WORK (SOW) FOR REDESIGN AND FABRICATION OF PRE-PRODUCTION FULL SCALE HEAT PIPE BLEED AIR COOLER (HP BAC)

1. Background

The Navy has identified a need for an improved Bleed Air Cooler (BAC), which handles temperatures as high as 925°F. The existing BAC has problems with extensive fouling due to precipitation of solids in the seawater coolant. It also has problems with undetected leakage or catastrophic failure and subsequent damage to other system components. As a result, the cleaning, replacement, and repair costs associated with continued use of this BAC are high.

The application of heat pipe technology to this BAC was identified as a potential solution to both problems. Heat pipes provide a controlled intermediate fluid for the transfer of heat between a high temperature heat source and a low temperature heat sink. The ability to closely control the temperature of this intermediate heat transfer fluid (contained in a hermetically sealed pipe) allows the surface temperatures of the heat pipe to be maintained at a value sufficiently low enough to prevent salt scaling when seawater is the heat sink medium. Moreover, the additional heat transfer boundaries between the seawater coolant stream and the bleed air stream, which are created by the use of the heat pipe, allow for early detection of corrosion related problems while avoiding catastrophic failure due to leakage of fluid between the two streams.

An abbreviated design study, which showed the feasibility of the concept, presented several workable designs and identified several technology development and modeling issues requiring further work prior to fabrication of a prototype full-scale heat pipe exchanger (FS-HPBAC). An advanced study based on further modeling and technology development successfully validated the feasibility of the concept and provided the data needed to confidently proceed with the design and fabrication of a full-scale cooler with a shell enclosure. Under contract N65540-03-C-0065 a prototype FS-HPBAC was fabricated and delivered to NSWC for shipboard testing. A short evaluation identified that a redesign would be required. This contract SOW is to address post evaluation and possible reuse of the prototype cooler as either a coupon or full-scale test evaluation cooler. If deemed not reusable, as a full scale cooler, a testing coupon large or small will still need to be addressed that will incorporate the lessons learned from the prototype cooler testing. Additionally on this SOW an option is being sought that would allow the government to procure either a production/preproduction FS-HPBAC, which includes all enhancements into the design that would be delivered to the Navy for further shipboard testing. Success of this technology application will have large paybacks in reduced maintenance and hazardous chemical usage and waste

2. Objectives

2.1. **BASE**--The first objective of this contract is to evaluate the existing prototype FS-HPBAC to see if it is capable of reuse and to revaluate the modeling criteria. If reusable propose a plan to address testing and steps to prepare for reuse along with validation testing, prior to on board shipboard testing. If not reusable propose a coupon plan, small or large, that will address the design elements of section 3.4 as well as certification of modeled performance via testing.

2.2. **BASE**--The second objective is to further develop a cost per unit for a production or preproduction FS-HP BAC. These cost are to be based on a production runs of 10 units per year, 25 units per year and 50 units per year.

2.3. **OPTION –1**--The third objective of this contract is to fabricate either a production/pre production FS-HPBAC. Modifying the prototype FS-HPBAC to achieve this is an option. The production/preproduction FS-HPBAC needs to incorporate the lessons learned from the prototype and the BASE redesign efforts into the design so that further testing of a FS-HPBAC can continue on board a US Navy surface combatant.

3. Scope of Work

The contractor shall provide services, materials, and personnel necessary to support the redesign and modifications, of the FS-HPBAC or coupon fabrication. This redesign effort is a follow on to the contractual efforts, which identified the technology during a feasibility study, determined the design through a modeling study and small component test evaluation, and lead to a full scale prototype fabrication. This effort is in conjunction with the Naval Surface Warfare Center, Carderock Division (NSWCCD-Philadelphia) Advanced Auxiliary Machinery Branch (Code 983). The obligations of the contractor shall include the following tasks:

3.1. Provide and review with NSWCCD-Philadelphia updated mathematical model results of the redesigned FS-HPBAC that will be incorporated into the fabrication of the FS-HPBAC or coupon. Recommendations for changes in the computer program models shall be made as appropriate.

3.2. Update any structural analysis of the redesign FS-HPBAC or coupon and provide suggestions for change as appropriate.

3.3. Provide updated drawing package in electronic format of the FS-HPBAC or coupon before fabrication commences. The drawing package shall be of sufficient detail to permit construction of individual components as well as the entire FS-HPBAC or coupon.

3.4. To be addressed in the redesign of the FS-HPBAC or coupon task.

3.4.1. **Post Evaluation of prototype FS-HPBAC:** The prototype cooler has been pulled and returned to NSWCCD-Philadelphia. An evaluation of the prototype is to be conducted that will identify if the cooler is reusable.

3.4.1.1. If reusable propose a plan to address testing and steps to prepare for reuse along with validation testing, prior to on board shipboard testing.

3.4.1.2. If not reusable propose a coupon plan, small or large, that will address the design elements of section 3.4 as well as certification of modeled performance via testing.

Any test or testing which may be necessary will need to be submitted in writing as part of the proposed plan to NSWCCD-Philadelphia for approval. Note shipboard testing of the prototype identified the operational abilities of each heat pipe within the tube sheet as a candidate for possible testing. This could establish if all heat pipes were operational and or identify individual heat pipe thermal resistances. Post analysis testing could also explain why the heat pipes are performing at approximately ? of their design conductance.

3.4.2. **Review and confirm design requirements:** Contractor and NSWC-Phila will review the design requirements. Technical recommendations are to design to 700 ^{o}F vice 925 ^{o}F and maintaining the requirement for heat pipe wall temperatures to stay under 150 ^{o}F to eliminate calcareous deposits. See Table 1 in Appendix-A

3.4.3. **Reduce Heat Pipe Thermal Resistance:** Data from the prototype FS-HPBAC testing identified that the current heat pipe thermal resistance is too high. In the redesign, address specific efforts and options of reducing the wall thickness and or change heat pipe materials. The objective is a thermal resistance value of 0.035^{o}C/W or lower. Fabricate 3 to 5 individual heat pipes to design lengths with

fins and test to confirm by measurement the heat pipe thermal resistance values. **Define the processes required to determine each heat pipe's individual thermal resistance.**

3.4.4. **Improved Fin Attachment and Fin Count:** The brazing of the fins on the heat pipes in the prototype had some shortcomings. Implement improved fin attachment assembly processes. Braze testing may need to be conducted to improve these brazing techniques. Casting is another option to possibly investigate. Consider increasing the fin count on the airside to additional fins/inch. These efforts need to bear better conduction and less thermal resistance into the heat pipes. **Define the revised attachment process to better conduction and reduce thermal resistance.**

Subscale Coupon Fabrication and Test: As indicated above it may be necessary for the contractor to confirm the redesign processes via a large or small coupon that will physically validate the heat pipe and fin characteristics. The measured performance should be compared against the predicted computer model performance to confirm the results. Upon any successful coupon testing and technical review, NSWC will need to confirm the modification and fabrication efforts of the production/preproduction FS-HPBAC as identified for a possible OPTION-1 award. The OPTION-1 will be at the discretion of NSWCCD-Philadelphia.

Demonstration Heat Pipes: Provide NSWC-Phila with 3 to 5 demonstration heat pipe with fins that are of the same configuration as those in the reused FS-HPBAC or coupon.

Welding and allied processes. Welding shall be in accordance with MIL-STD-278. Brazing may be used where applicable. For brazing nickel-containing alloys such as composition 70-30 or 90-10 copper-nickel, grade IV silver-base brazing alloy in accordance with QQ-B-654 shall be used. Brazing of piping joints including root connections shall be accomplished in accordance with NAVSEA 0900-LP-001-7000; were these joints are ½ inch or larger in nominal sizes smaller than ½ inch.

Weld strength. For calculating the strength of welded joints, weld efficiencies shall be in accordance with MIL-STD-278

Develop and provide a cost per unit of a production FS-HPBAC based upon the revised design parameters of the this base contractual effort and based on production runs of 10 units per year, 25 units per year and 50 units per year.

Attend meetings with NSWCCD-Philadelphia in accordance with the contract POA&M to review progress on the tasks delineated above.

Provide a final report describing the work accomplished on the redesign efforts of the base contractual efforts. This report shall discuss the results of the reuse of the prototype FS-HPBAC or coupon, fabrication of test articles, the cost analysis for fabrication of multiple units, any revisions to the geometry and design parameters, and provide a list of tasks required to fabricate a production or preproduction FS-HP BAC for shipboard use.

Travel as defined below:

Item	Purpose	Location	People **(per trip)**	Trips	Days **(per trip)**
BASE					
1	**Progress meeting (3.7)**	**NSWC-Philadelphia, Pennsylvania**	**3**	**2**	**1**
2	Testing of any subscale cooler	TBD (Assume West	2	1	5

	(3.4.5)	Coast)			
OPTION-1					
1	Progress meeting (3.12)	NSWC-Philadelphia, Pennsylvania	3	2	1
2	Testing of FS-HPBAC (3.14)	TBD (Assume West Coast)	2	1	5
3	FS-HPBAC Delivery (3.15)	Norfolk Navy Base, VA	2	1	3

Option 1

As part of the total redesign effort a FS-HPBAC will be needed. Following the work to be completed under the BASE segment of the contract or as the Navy sees fit, a production/preproduction FS-BAC will need to be provided that will further address the additional technical areas. The FS-HPBAC needs to incorporate the lessons learned from the prototype and the BASE redesign efforts into the design so that further testing of a FS-HPBAC can continue onboard a US Navy surface combatant. Final review and approval of the FS-HPBAC will be needed from the Navy prior to actual start of the OPTION-1. A production/preproduction FS-HPBAC will need to:

Provide a more optimum cross flow pattern through the cooler to improve thermal design

Accommodate the redesigned pipe heights and fins

Accommodate and provide delta P data monitoring ports into the shell sections of redesigned FS-PRE-PROD-HPBAC.

Accommodate and provide inlet turbolator into the hot air shell inlet nozzle.

Modifying the prototype FS-HPBAC or building new production/preproduction FS-HPBAC are acceptable approaches. This will allow the NAVY to further test and validate the technology on a DDG-51 class surface combatant.

The final fabrication of the FS-HPBAC must be based off of data and information collected during the prototype FS-HPBAC and the lessons learned in the BASE contract. See the table 1 in Appendix A for performance specifications.

Attend meetings with NSWC-Phila in accordance with the contract POA&M to review progress on the tasks delineated above.

Provide a final report describing the work accomplished on the FS-HPBAC. This report shall discuss the results of the FS-HPBAC fabrication, the cost analysis for fabrication of multiple units, any revisions to the geometry and design parameters, and provide a list of tasks required to fabricate the production/preproduction FS-HP BAC for shipboard use.

Prior to delivery and evaluation of the production /preproduction FS-HPBAC will need to be completed.

Hydrostatic pressure test. Unless otherwise specified the air side and waterside of the cooler shall each be hydrostatically tested at 1-1/2 times the design pressure or 100 lb/in^2, whichever is greater. Joints shall be bone dry after pressure has been held for 15 minutes. Clean fresh water shall be used unless specified otherwise.

Thermal performance test: To determine any possible short falls in the design or fabrication with the cooler. Contractor needs to run a 20 to 40 hour performance test to evaluate and the coolers measured performance against computer model predicted analysis. Define what the operational characteristics of the HPBAC will between 500 ^oF to 700 ^oF with airflows between 1500 SCFM to 2500 SCFM. Report results.

NSWC-Phila takes delivery of the FS-HPBAC in Norfolk, VA for install onto DDG-51 class ship where a 1-year performance test would be performed. The time and date are to be determined in accordance with the POA&M developed between the contractor and NSWC-Phila for this contract

Note the Option-1 production/preproduction FS-HPBAC will most likely be used for shock and vibration qualifications. It will not have to pass these requirements before the 1 year shipboard validation period.

Welding and allied processes. Welding shall be in accordance with MIL-STD-278. Brazing may be used where applicable. For brazing nickel-containing alloys such as composition 70-30 or 90-10 copper-nickel, grade IV silver-base brazing alloy in accordance with QQ-B-654 shall be used. Brazing of piping joints including root connections shall be accomplished in accordance with NAVSEA 0900-LP-001-7000; were these joints are ½ inch or larger in nominal sizes smaller than ½ inch.

Weld strength. For calculating the strength of welded joints, weld efficiencies shall be in accordance with MIL-STD-278

4. Deliverables:

Item	Performance Description	SOW REF	Unit	Delivery (Days after award)
BASE				
001	Post Analysis of Prototype FS-HPBAC	3.4	1 tech report	120
002	Proposed Plan for reuse Prototype FS-HPBAC or Proposed Plan for large or small coupon evaluation - Define the processes require to determine each pipes individual thermal resistance - Define the revised fin attachment process to better improve conduction and reduce thermal resistance - Design drawing package for reused cooler or coupon	3.4	1 tech report	120
003	Testing results of redesign or coupon	3.8	1 tech report	250
004	Deliver redesign cooler	3.4.5	1 cooler	300
005	Deliver 3 o 5 demonstration pipes	3.4.6	3 to 5 heat pipes	260
006	Production Cost Projections of FS-HPBAC	3.10	1 report	300
007	Final Report	3.12	1 report	300
OPTION -1				
001	Refine mathematical model and verified calculations for FS-HPBA	3.10 & 3.11	1 tech. report	60
002	Refine structural and thermal analysis for FS-HPBA C	3.10 & 3.11	1 tech. report	60
003	Final redesigned FS-HPBAC drawing package	3.10 & 3.11	1 electronic report	60
004	Deliver one FS-HPBA for shipboard evaluation along with testing	3.15	1 HP-BAC w/testing report	300
005	Final Report	3.13 & 3.14	1 report	300

5. Government Furnished Information and Materials:

5.1. The Government will provide the contractor with on-site access at NSWC-Phila and Norfolk Naval Base, current bleed air cooler specifications, welding specifications, and material specifications.

5.2. For planning, scheduling, and team coordination, the use of the NSWC-Phila developed Microsoft-Project Gantt chart of the test plan will be used for performing and tracking the work to be completed by NSWC-Phila and contractor. NSWC-Phila will maintain and update the chart as required by the project and will provide copies to contracted.

5.3. Since a prototype FS-HPBAC has been built it is understood that changes may still be needed as the redesign progress in the base contract. However it's anticipated that these changes should be minimal and should not have affect on delivery or schedule of the base redesign effort.

5.4. The prototype FS-HPBAC is currently at NSWC-Phila. This cooler will be made available to the contracted for post evaluation, reuse if deemed so and modification if deemed so for the production or preproduction FS-HPBAC as identified in option-1

5.5. Table 3 in Appendix A, provided, shows references and applicable documents that will be the governing documents that make up the procurement specification for implementing the reused prototype FS-HPBAC or the production/preproduction FS-HPBAC to the fleet. This table provides a reference guide into how possible technical problems will be resolved. Note the reused prototype FS-HPBAC or coupon does not have to pass shock and vibration qualification testing. Under a separate contract the final production FS-HPBAC for fleet use will have to pass shock and vibration requirements. It's anticipated that this contract will require a full ship set of cooler, which are used to support the bleed air system on a surface combatant. A full ship set of coolers is comprised of 2 Masker, 2 Prairie and 1 Start Air.

6. Performance and Deliveries:

6.1. Period of Performance: The period of performance for this contract is from date of issuance until final delivery scheduled in Section 4.

6.2. Place of Performance: The primary place of performance will be at the contractor's facilities and as required at the NSWC-Phila sites. Additional efforts shall be required at locations specified by the contractor.

6.3. Travel Requirements: Travel between the contractor's facilities and the NSWC-Phila site shall be necessary for coordination and planning.

6.4. Points of Contact: The technical Point of Contact (TPOC) for this contract is Mr. Denis Colahan, Code 983 (215-897-7231).

6.5. Security Requirements: Unclassified.

APPENDIX A

TABLE – 1 HEAT PIPE COOLER - DESIGN PERFORMANCE DATA

PERFORMANCE DATA	Bleed Air Cooler	
COOLER CHARACTERISTICS:	AIR SIDE	WATER SIDE
FLUID CIRCULATED	AIR (2450 SCFM)	SEAWATER
FLOW RATE (LB/HR)	11,231	46,350
INLET TEMPERATURE (^{O}F)	925	85
OUTLET TEMPERATURE (^{O}F)	325	100
PRESSURE DROP (ALLOW (PSI)	3.5	3.0
VELOCITY AT INLET FLANGE FACE (FT/SEC)	199	4
MAX. INTERNAL VELOCITY (FT/SEC)	85 to 90	3
NUMBER OF PASSES	1	1
DESIGN PRESSURE (PSIG)	100	50
TEST PRESSURE (PSIG)	150	100
DESIGN TEMPERATURE (^{O}F)	700	300
LOG MEAN TEMPERATURE DIFFERENTIAL (LMTD) (^{O}F)	535.8	
HEAT TRANSFER RATE CLEAN (BTU/HR/SQ FT./^{O}F)	19	
HEAT TRANSFER SURFACE AREA (SQ FT.)	140	
HEAT EXCHANGE (BTU/HR) (APPROX)	1,423,800	
WEIGHT DRY (LBS, less than)	1,900	
HEAT PIPE CHARACTERISTICS:		
HEAT PIPE WORKING FLUID	WATER	
MAX. HEAT LOAD / HEAT PIPE (WATTS/PIPE)	2863	
MAX WATER SIDE PIPE WALL TEMP. (^{O}F) at 925 ^{O}F inlet air	172	
MAX. WATER SIDE PIPE WALL TEMP. (^{O}F) at 700 ^{O}F inlet air	150	
SINGLE PIPE THERMAL RESISTANCE WITH FINS (^{o}C/WATT)		
Target goal for redesign pre-production HP BAC	0.035	

TABLE 2. Cooler materials.

Item	Parts	Materials	Specification
1	Shell	Copper-nickel alloy, composition 70-30	MIL-T15005 or MIL-T-22214
2	Stay bolts and shell Side baffles	Stainless Steel (AISI) grade 347)	ASTM A 240 or ASTM A 473 or ASTM F 593
3	Water-boxes	Copper alloy C90300 or Valve bronze, alloy C92200 or Copper-nickel alloy, Composition 70-30	QQ-C-390 ASTM B 584 or ASTM B 61 MIL-T-15726
4	Heat pipe support sheets / tube sheet	Copper-nickel alloy, composition 70-30	MIL-T-15726
5	Tube sheet bushing	Copper-nickel alloy, composition 70-30	MIL-T-15726
6	Heat pipes	Copper-nickel alloy, composition 70-30	MIL-T15005 or MIL-T-22214
7	Fins air & water side	Copper-nickel alloy, Composition 90-10;	MIL-C-15726
8	Threaded fasteners	Nickel alloy	MIL-S-1222
9	Zinc protectors	Zinc	MIL-A-19521
10	Plugs, zinc support	Copper-nickel alloy, composition 70-30	MIL-C-15726
11	Gaskets	Rubber sheet, cloth insert; or Non-asbestos sheet, compresses	HH-P-151 HH-P-46 MIL-G-24696
12	Pipe plugs and adapters	Valve bronze, alloy C92200 Copper alloy C90300; or Copper-nickel alloy; Composition 70-30	ASTM B 505 QQ-C-390 MIL-C-15726 or MIL-C-24679
13	Zinc inspection Covers	Copper-nickel alloy, Composition 90-10; Copper alloy C90300; or Valve bronze, alloy C92200	MIL-C-15726 QQ-C-390 ASTM B 584 or ASTM B 61

TABLE – 3 References and Applicable Documents

Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein

SPECIFICATIONS

FEDERAL

HH-P-46	Packing; Asbestos, Sheet, Compressed
HH-P-151	Packing: Rubber-Sheet, Cloth-Insert
QQ-C-390	Copper Alloy Castings (including Cast Bar)

MILITARY

MIL-P-116	Preservation, Methods of
MIL-S-901	Shock Tests, HI (High Impact) Shipboard Machinery, Equipment, and Systems, Requirements for Navy
MIL-A-907	Anti-seize Thread Compound, High Temperature.
MIL-S-1222	Studs, Bolts, Hex Cap-Screws, Socket Head Cap-Screws and Nuts
MIL-T-15005	Tubes, Condenser and Heat Exchanger, Copper-Nickel Alloys (UNS C70600 & C71500)
MIL-P-15024	Plates, Tags and Bands for Identification of Equipment
MIL-P-15024/5	Plates, Identification
MIL-C-15726	Copper-Nickel Alloy, Sheet Plate, Strip, Bar, Rod and Wire
MS-16142	Boss, Gasket Seal Straight Thread Tube Fitting, Standard Dimensions for
MIL-T-16420	Tube, Copper-Nickel Alloy, Seamless and Welded (Copper Alloy Numbers 715 and 706)
MIL-L-19140	Lumber and Plywood, Fire-Retardant Treated
MIL-A-19521	Anodes, Corrosion Preventive, Zinc and Plugs, Zinc Anode Retaining: Design of and Installation in Shipboard Condensers and Heat Exchangers
MIL-F-20042	Flanges, Pipe and Bulkhead, Bronze (Silver Brazing)
MIL-G-21610	Gaskets, Heat Exchanger, Various Cross Section Rings, Synthetic Rubber
MIL-22214	Tube, Condenser and Heat Exchanger with Integral Fins
MIL-S-22473	Sealing, Locking, and Retaining Compounds: (Single-Component)
MIL-C-24679	Copper-Nickel Alloy Forgings and Forging Stock
MIL-G-24696	Gasket, Sheet, Non-Asbestos

Cont. TABLE – 3 References and Applicable Documents

MILITARY

MIL-STD-22	Welded Joint Design
MIL-STD-167-1	Mechanical Vibrations of Shipboard Equipment (Type l – Environmental and Type ll Internally Excited)
MIL-STD-278	Welding and Casting Standard
MIL-STD-1186	Cushioning, Anchoring, Bracing, Blocking and Waterproofing: with Appropriate Test Methods
DOD0STD-1399	Interface Standards for Shipboard Systems
Section 301	Section 301 Ship Motion and Attitude (Metric)
MIL-STD-2073-1	DOD Material Procedures for Development and Application of Packaging Requirements

DRAWINGS

NAVAL SEA SYSTEMS COMMAND (NAVSEA*)*

810-1385915	Fittings, Pipe, Composition, Flanged. 100P.S.I. Max at 425°F Max. for all Services
B-214	Root Connections for Attaching Piping
810-1385850 Rev**. G**	Piping, Instrument, Pressure for all Service

PUBLICATION

NAVAL SEA SYSTEMS COMMAND (NAVSEA)

0900-P-001-7000	Piping Systems Brazed, Fabrication and Inspection.
S9074-AQ-GIB-010	Requirements for Fabrication Welding and Inspection, and Casting Inspection and Repair for Machinery, Piping, and Pressure Vessels. Stock Number 0910-LP-731-4600

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

Boiler and pressure Vessel Code (BPVC), Section III, Nuclear Power Plant Components.
Boiler and Pressure Vessel Code (BPVC), Section VIII, Division 1 – Rules for Construction of Unfired Pressure Vessels.

Cont. TABLE – 3 References and Applicable Documents

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

A 240	Standard Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate Sheet, and Strip for Pressure Vessels

STANDARD SPECIFICATION FOR STAINLESS AND HEAT-RESISTING STEEL FORGINGS.

B 61	Standard Specification for Steam or Valve Bronze Casting.
B505	Copper Base Alloy Continuous Casting.
B584	Standard Specification for Copper Alloy Sand Castings for General Applications.
D 3951	Standard Practice for Commercial Packaging, (DoD adopted).
F 593	Standard Specification for Stainless Steel Bolts, Hex Cap Screws and Studs.

CONTRACT DATA REQUIREMENTS LIST

(2 Data Items)

Form Approved OMB No. 0704-0188

A. CONTRACT LINE ITEM NO.	B. EXHIBIT A	C. CATEGORY: TDP X TM OTHER

D. SYSTEM/ITEM: redesign heat pipe bleed air cooler

E. CONTRACT/PR NO.

F. CONTRACTOR

1. DATA ITEM NO.: A001

2. TITLE OF DATA ITEM: Post Analysis of Prototype FS-HP-BAC

3. SUBTITLE

17. PRICE GROUP

4. AUTHORITY *(Date Acquisition Document No.)*

5. CONTRACTING REFERENCE: SOW (section 3.4)

6. REQUIRING OFFICE: NSWCCD-SSES 9823

18. ESTIMATED TOTA L PRICE

7. DD 250 REQ

8. APP CODE

9. DIST STATEMENT REQUIRED

10. FREQUENCY: 1-R eport

11. AS OF DATE

12. DATE OF FIRST SUBMISSION: 120 days AROO

13. DATE OF SUBSEQUENT SUBMISSION

14. DISTRIBUTION

a. ADDRESSEE	b. COPIES Drafts	Final Reg	Final Repro
code 82		1	
15. TOTAL		1	

16. REMARKS:

1. DATA ITEM NO.: A002

2. TITLE OF DATA ITEM: Proposed Plan for reuse of Prototype FS-HPBAC or proposed plan for large or samall coupon evaluation

3. SUBTITLE

17. PRICE GROUP

4. AUTHORITY *(Date Acquisition Document No.)*

5. CONTRACTING REFERENCE: SOW (section 3.4)

6. REQUIRING OFFICE: NSWCCD-SSES 9823

18. ESTIMATED TOTAL PRICE

7. DD 250 REQ

8. APP CODE

9. DIST STATEMENT REQUIRED

10. FREQUENCY: 1 Reports

11. AS OF DATE

12. DATE OF FIRST SUBMISSION: 120 days AROO

13. DATE OF SUBSEQUENT SUBMISSION

14. DISTRIBUTION

a. ADDRESSEE	b. COPIES Drafts	Final Reg	Final Repro
cose 82		1	
15. TOTAL		1	

16. REMARKS:

G. PREPARED BY:	H. DATE	I. APPROVED BY	J. DATE
Denis Colahan	1-May -2006	John Kuseian	1-MAY -2006

DD Form 1423-2, JUN 90 1059/183

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CONTRACT DATA REQUIREMENTS LIST

(2 Data Items)

Form Approved OMB No. 0704-0188

A. CONTRACT LINE ITEM NO.	B. EXHIBIT	C. CATEGORY:
	A	TDP **X** TM OTHER

D. SYSTEM/ITEM: Redesign heat pipe bleed air cooler

E. CONTRACT/PR NO.

F. CONTRACTOR

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE	17. PRICE GROUP
A003	**testing results of redesign or coupon**		

4. AUTHORITY *(Date Acquisition Document No.)*	5. CONTRACTING REFERENCE	6. REQUIRING OFFICE	18. ESTIMATED TOTAL PRICE
	SOW (section 3.8)	**NSWCCD-SSES 9823**	

7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION	14. DISTRIBUTION
		1-report	**250 days AROO**	a. ADDRESSEE
8. APP CODE		11. AS OF DATE	13. DATE OF SUBSEQUENT SUBMISSION	

b. COPIES		
	Final	
Drafts	Reg	Repro
	1	

16. REMARKS:

a. ADDRESSEE	b. COPIES		
		Final	
	Drafts	Reg	Repro
code 82		1	
15. TOTAL		1	

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE	17. PRICE GROUP
A004	deliver dedesign cooler		

4. AUTHORITY *(Date Acquisition Document No.)*	5. CONTRACTING REFERENCE	6. REQUIRING OFFICE	18. ESTIMATED TOTAL PRICE
	SOW (section 3.4.5	)NSWCCD-SSES 9823	

7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION	14. DISTRIBUTION
		1-Assembly	**300 days AROO**	a. ADDRESSEE
8. APP CODE		11. AS OF DATE	13. DATE OF SUBSEQUENT SUBMISSION	

b. COPIES		
	Final	
Drafts	Reg	Repro
	1	

16. REMARKS:

a. ADDRESSEE	b. COPIES		
		Final	
	Drafts	Reg	Repro
Code 82		1	
15. TOTAL		1	

G. PREPARED BY:	H. DATE	I. APPROVED BY	J. DATE
Denis Colahan	**1-May -2006**	**John Kuseian**	**1-MAY -2006**

DD Form 1423-2, JUN 90
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CONTRACT DATA REQUIREMENTS LIST

(2 Data Items)

Form Approved OMB No. 0704-0188

A. CONTRACT LINE ITEM NO.	B. EXHIBIT A	C. CATEGORY: TDP **X** TM OTHER

D. SYSTEM/ITEM: Redesign heat pipe bleed air cooler

E. CONTRACT/PR NO.

F. CONTRACTOR

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE	17. PRICE GROUP
A005	**deliver 5 demonstration pipes**		

4. AUTHORITY *(Date Acquisition Document No.)*	5. CONTRACTING REFERENCE	6. REQUIRING OFFICE	18. ESTIMATED TOTAL PRICE
	SOW (section 3.4.6)	**NSWCCD-SSES 9823**	

7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION	14. DISTRIBUTION
		1 Report	**260 days AROO**	

8. APP CODE	11. AS OF DATE	13. DATE OF SUBSEQUENT SUBMISSION

16. REMARKS:

a. ADDRESSEE	b. COPIES		
	Drafts	Final Reg	Final Repro
code 82		1	
15. TOTAL		1	

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE	17. PRICE GROUP
A006	production cost projections of FS-HPBAC		

4. AUTHORITY *(Date Acquisition Document No.)*	5. CONTRACTING REFERENCE	6. REQUIRING OFFICE	18. ESTIMATED TOTAL PRICE
	SOW (sectoin 3.10)	NSWCCCD-SSES 9823	

7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION	14. DISTRIBUTION
		1 Report	**300 days AROO**	

8. APP CODE	11. AS OF DATE	13. DATE OF SUBSEQUENT SUBMISSION

16. REMARKS:

a. ADDRESSEE	b. COPIES		
	Drafts	Final Reg	Final Repro
15. TOTAL			

G. PREPARED BY:	H. DATE	I. APPROVED BY	J. DATE
Denis Colahan	**1-May -2006**	**John Kuseian**	**1-MAY -20**

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CONTRACT DATA REQUIREMENTS LIST

(2 Data Items)

Form Approved
OMB No. 0704-0188

A. CONTRACT LINE ITEM NO.	B. EXHIBIT	C. CATEGORY: TDP TM OTHER

D. SYSTEM/ITEM: Redesign heat pipe bleed air cooler

E. CONTRACT/PR NO.

F. CONTRACTOR

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE	17. PRICE GROUP
A007	**final report**		

4. AUTHORITY *(Date Acquisition Document No.)*	5. CONTRACTING REFERENCE	6. REQUIRING OFFICE	18. ESTIMATED TOTAL PRICE
	SOW (sectoin 3.12)	**NSWCCD-SSES 9823**	

7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION	14. DISTRIBUTION	b. COPIES		
		1-report	**300 AOOR**	a. ADDRESSEE	Drafts	Final Reg	Final Repro
8. APP CODE		11. AS OF DATE	13. DATE OF SUBSEQUENT SUBMISSION				

16. REMARKS:

15. TOTAL

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE	17. PRICE GROUP

4. AUTHORITY *(Date Acquisition Document No.)*	5. CONTRACTING REFERENCE	6. REQUIRING OFFICE	18. ESTIMATED TOTAL PRICE

7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION	14. DISTRIBUTION	b. COPIES		
				a. ADDRESSEE	Drafts	Final Reg	Final Repro
8. APP CODE		11. AS OF DATE	13. DATE OF SUBSEQUENT SUBMISSION				

16. REMARKS:

15. TOTAL

G. PREPARED BY:	H. DATE	I. APPROVED BY	J. DATE
Denis Colahan	**1-May -2006**	**John Kuseian**	**1-MAY -2006**

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CONTRACT DATA REQUIREMENTS LIST

(2 Data Items)

Form Approved OMB No. 0704-0188

A. CONTRACT LINE ITEM NO.	B. EXHIBIT A	C. CATEGORY: TDP X TM OTHER

D. SYSTEM/ITEM: Option -1 - FS-heat pipe bleed air cooler

E. CONTRACT/PR NO.

F. CONTRACTOR

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE	17. PRICE GROUP
B001	**Refine mathematical model and verified calculations for FS-HPBAC**		
4. AUTHORITY *(Date Acquisition Document No.)*	5. CONTRACTING REFERENCE **SOW (section 3.10 & 3.11)**	6. REQUIRING OFFICE **NSWCCD-SSES 9823**	18. ESTIMATED TOTAL PRICE

7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION	14. DISTRIBUTION	b. COPIES		
		1-Report	**60 days AROO**	a. ADDRESSEE		Final	
8. APP CODE		11. AS OF DATE	13. DATE OF SUBSEQUENT SUBMISSION		Drafts	Reg	Repro
16. REMARKS:				**code 82**		**1**	
				15. TOTAL		1	

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE	17. PRICE GROUP
B002	Refine structural and thermal analysis for FS-HPBAC		
4. AUTHORITY *(Date Acquisition Document No.)*	5. CONTRACTING REFERENCE **SOW (section 3.10 & 3.11)**	6. REQUIRING OFFICE NSWCCD-SSES 9823	18. ESTIMATED TOTAL PRICE

7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION	14. DISTRIBUTION	b. COPIES		
		1 Reports	**60 days AROO**	a. ADDRESSEE		Final	
8. APP CODE		11. AS OF DATE	13. DATE OF SUBSEQUENT SUBMISSION		Drafts	Reg	Repro
16. REMARKS:				**cose 82**		1	
				15. TOTAL		**1**	

G. PREPARED BY:	H. DATE	I. APPROVED BY	J. DATE
Denis Colahan	**1-May -2006**	**John Kuseian**	**1-MAY-2006**

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CONTRACT DATA REQUIREMENTS LIST

(2 Data Items)

Form Approved OMB No. 0704-0188

A. CONTRACT LINE ITEM NO.	B. EXHIBIT	C. CATEGORY:		
	A	TDP **X**	TM	OTHER

D. SYSTEM/ITEM	E. CONTRACT/PR NO.	F. CONTRACTOR
Option -1 - FS-heat pipe bleed air cooler		

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE	17. PRICE GROUP
B003	**Final redesigned FS-HPBAC drawing package**		

4. AUTHORITY *(Date Acquisition Document No.)*	5. CONTRACTING REFERENCE	6. REQUIRING OFFICE	18. ESTIMATED TOTAL PRICE
	SOW (section 3.10 & 3.11)	**NSWCCD-SSES 9823**	

7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION	14. DISTRIBUTION	b. COPIES		
		1-report	**60 days AROO**	a. ADDRESSEE		Final	
8. APP CODE		11. AS OF DATE	13. DATE OF SUBSEQUENT SUBMISSION		Drafts	Reg	Repro
16. REMARKS:				**code 82**		**1**	
				15. TOTAL		1	

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE	17. PRICE GROUP
B004	deliver one FS-HPBAC for shipboard evaluation along with testing		

4. AUTHORITY *(Date Acquisition Document No.)*	5. CONTRACTING REFERENCE	6. REQUIRING OFFICE	18. ESTIMATED TOTAL PRICE
	SOW (section 3.15)	)NSWCCD-SSES 9823	

7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION	14. DISTRIBUTION	b. COPIES		
		1-Assembly	**300 days AROO**	a. ADDRESSEE		Final	
8. APP CODE		11. AS OF DATE	13. DATE OF SUBSEQUENT SUBMISSION		Drafts	Reg	Repro
16. REMARKS:				**Code 82**		1	
				15. TOTAL		**1**	

G. PREPARED BY:	H. DATE	I. APPROVED BY	J. DATE
Denis Colahan	**1-May -2006**	**John Kuseian**	**1-MAY -2006**

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CONTRACT DATA REQUIREMENTS LIST

(2 Data Items)

Form Approved OMB No. 0704-0188

A. CONTRACT LINE ITEM NO.	B. EXHIBIT A	C. CATEGORY: TDP **X** TM OTHER

D. SYSTEM/ITEM: Option -1 - FS-heat pipe bleed air cooler

E. CONTRACT/PR NO.

F. CONTRACTOR

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE	17. PRICE GROUP
B005	**final report**		

4. AUTHORITY *(Date Acquisition Document No.)*	5. CONTRACTING REFERENCE	6. REQUIRING OFFICE	18. ESTIMATED TOTAL PRICE
	SOW (section 3.13 & 3.14)	**NSWCCD-SSES 9823**	

7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION	14. DISTRIBUTION	b. COPIES		
		1 Report	**300 days AROO**			Final	
8. APP CODE		11. AS OF DATE	13. DATE OF SUBSEQUENT SUBMISSION	a. ADDRESSEE	Drafts	Reg	Repro
16. REMARKS:				**code 82**		**1**	
				15. TOTAL		1	

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE	17. PRICE GROUP

4. AUTHORITY *(Date Acquisition Document No.)*	5. CONTRACTING REFERENCE	6. REQUIRING OFFICE	18. ESTIMATED TOTAL PRICE

7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION	14. DISTRIBUTION	b. COPIES		
						Final	
8. APP CODE		11. AS OF DATE	13. DATE OF SUBSEQUENT SUBMISSION	a. ADDRESSEE	Drafts	Reg	Repro
16. REMARKS:							
				15. TOTAL			

G. PREPARED BY:	H. DATE	I. APPROVED BY	J. DATE
Denis Colahan	**1-May -2006**	**John Kuseian**	**1-MAY -20**

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Section D - Packaging and Marking

PACKAGING
PACKAGING INSTRUCTIONS

Packaging for CLIN'S 0001 and 0002 through 0002AF is to be in accordance with best commercial practices.
Packaging for CLIN'S 0003 and 0004 through 0004AD is also to be in accordance with best commercial practices.

Section E - Inspection and Acceptance

INSPECTION AND ACCEPTANCE TERMS

Supplies/services will be inspected/accepted at:

CLIN	INSPECT AT	INSPECT BY	ACCEPT AT	ACCEPT BY
0001	Destination	NSWC Code 9823	Destination	NSWC Code 9823
0002	Destination	NSWC Code 9823	Destination	NSWC Code 9823
0003	Destination	NSWC Code 985	Destination	NSWC Code 985
0004	Destination	NSWC Code 985	Destination	NSWC Code 985

CLAUSES INCORPORATED BY REFERENCE

52.246-2	Inspection Of Supplies--Fixed Price	AUG 1996
52.246-4	Inspection Of Services--Fixed Price	AUG 1996
52.246-7	Inspection Of Research And Development Fixed Price	AUG 1996
52.246-16	Responsibility For Supplies	APR 1984
252.246-7000	Material Inspection And Receiving Report	MAR 2003

Section F - Deliveries or Performance

CLAUSES INCORPORATED BY REFERENCE

52.242-15	Stop-Work Order	AUG 1989
52.242-17	Government Delay Of Work	APR 1984
52.247-34	F.O.B. Destination	NOV 1991

CLAUSES INCORPORATED BY FULL TEXT

52.211-8 TIME OF DELIVERY (JUN 1997)

(a) The Government requires delivery to be made according to the following schedule:

REQUIRED DELIVERY SCHEDULE

Item 0001

Within 300 Days After Date of Award

Item No. Quantity of Contract 1

Shipping Address for Item 0001:
Naval Surface Warfare Center
C/O Philadelphia Business Center
5001 South Broad Street
Philadelphia, PA 19112-5083
Marked for: Code 985 (Mr. Denis Colahan)

Item 0002

In accordance with DD1423

Item 0003

Within 10 Months After Exercise of Option

Shipping Address for Item 0003:
Naval Surface Warfare Center
C/O Philadelphia Business Center
5001 South Broad Street
Philadelphia, PA 19112-5083
Marked for: Code 985 (Mr. Denis Colahan)

Item No. Quantity of Contract 1

Item 0004

In accordance with DD1423

The Government will evaluate equally, as regards time of delivery, offers that propose delivery of each quantity within the applicable delivery period specified above. Offers that propose delivery that will not clearly fall within the applicable required delivery period specified above, will be considered nonresponsive and rejected. The Government reserves the right to award under either the required delivery schedule or the proposed delivery schedule, when an offeror offers an earlier delivery schedule than required above. If the offeror proposes no other delivery schedule, the required delivery schedule above will apply.

OFFEROR'S PROPOSED DELIVERY SCHEDULE

_____

Within Days

After Date

Item No. Quantity of Contract

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____

(b) Attention is directed to the Contract Award provision of the solicitation that provides that a written award or acceptance of offer mailed, or otherwise furnished to the successful offeror, results in a binding contract. The Government will mail or otherwise furnish to the offeror an award or notice of award not later than the day award is dated. Therefore, the offeror should compute the time available for performance beginning with the actual date of award, rather than the date the written notice of award is received from the Contracting Officer through the ordinary mails. However, the Government will evaluate an offer that proposes delivery based on the Contractor's date of receipt of the contract or notice of award by adding (1) five calendar days for delivery of the award through the ordinary mails, or (2) one working day if the solicitation states that the contract or notice of award will be transmitted electronically. (The term "working day" excludes weekends and U.S. Federal holidays.) If, as so computed, the offered delivery date is later than the required delivery date, the offer will be considered nonresponsive and rejected.

(End of clause)

Section G - Contract Administration Data

CLAUSES INCORPORATED BY FULL TEXT

CAR-G09 PAYMENT INSTRUCTIONS FOR MULTIPLE ACCOUNTING CLASSIFICATION CITATIONS (OCT 2005)

The payment office will make payment in sequential ACRN order within the contract, exhausting all funds in the previous ACRN before paying from the next ACRN using the following sequential order: alpha/alpha; alpha/numeric; numeric/alpha; and numeric/numeric.

(End of Clause)

CAR-G10 ELECTRONIC SUBMISSION OF PAYMENT REQUESTS (FEB 2006) (NSWCCD)

This clause applies to the extent the clause at DFARS 252.232-7003, "Electronic Submission of Payment Requests" appears elsewhere in this contract. This clause provides supplemental information with respect to the electronic submission of payment requests under DFARS 252.232-7003.

The Defense Finance and Accounting Service (DFAS) has limited electronic processing of contractor payment requests to the Wide Area WorkFlow Receipt and Acceptance (WAWF-RA) form identified in the clause at DFARS 252.232-7003. However, an interface between the Naval Surface Warfare Center, Carderock Division (NSWCCD) financial system and WAWF-RA is not available. As a result, NSWCCD cannot process invoices submitted by the contractor for payment via the WAWF-RA. NSWCCD is currently working with the WAWF-RA program office to develop an interface between the NSWCCD financial system and WAWF-RA.

Unless the contractor and the contracting officer agree to an alternate method, the contractor shall submit payment requests, using other than an electronic form, in accordance with the applicable payment clauses of this contract.

The contractor agrees to comply with the clause at DFARS 252.232-7003 when notified by the contracting officer that the interface between the NSWCCD financial system and WAWF-RA is available and capable of processing invoices submitted electronically by the contractor for payment.

(End of Clause)

Section H - Special Contract Requirements

CLAUSES INCORPORATED BY FULL TEXT

OPTION TO EXTEND THE TERM OF THE CONTRACT

(a) The Government may extend the term of this contract by written notice to the Contractor within 6 months after completion of CLIN 0001.

(b) If the Government exercises this option, the extended contract shall be considered to include this option clause.

(c) The total duration of this contract, including the exercise of any options under this clause, shall not exceed 780 days after date of award.
(End of clause)

Section I - Contract Clauses

CLAUSES INCORPORATED BY REFERENCE

52.202-1	Definitions	JUL 2004
52.203-3	Gratuities	APR 1984
52.203-5	Covenant Against Contingent Fees	APR 1984
52.203-6	Restrictions On Subcontractor Sales To The Government	JUL 1995
52.203-7	Anti-Kickback Procedures	JUL 1995
52.203-8	Cancellation, Rescission, and Recovery of Funds for Illegal or Improper Activity	JAN 1997
52.203-10	Price Or Fee Adjustment For Illegal Or Improper Activity	JAN 1997
52.203-12	Limitation On Payments To Influence Certain Federal Transactions	SEP 2005
52.204-4	Printed or Copied Double-Sided on Recycled Paper	AUG 2000
52.204-7	Central Contractor Registration	OCT 2003
52.209-6	Protecting the Government's Interest When Subcontracting With Contractors Debarred, Suspended, or Proposed for Debarment	JAN 2005
52.211-5	Material Requirements	AUG 2000
52.211-15	Defense Priority And Allocation Requirements	SEP 1990
52.215-2	Audit and Records--Negotiation	JUN 1999
52.215-8	Order of Precedence--Uniform Contract Format	OCT 1997
52.215-14	Integrity of Unit Prices	OCT 1997
52.219-4	Notice of Price Evaluation Preference for HUBZone Small Business Concerns	JUL 2005
52.219-14	Limitations On Subcontracting	DEC 1996
52.222-3	Convict Labor	JUN 2003
52.222-19	Child Labor -- Cooperation with Authorities and Remedies	JAN 2006
52.222-20	Walsh-Healey Public Contracts Act	DEC 1996
52.222-21	Prohibition Of Segregated Facilities	FEB 1999
52.222-26	Equal Opportunity	APR 2002
52.222-35	Equal Opportunity For Special Disabled Veterans, Veterans of the Vietnam Era, and Other Eligible Veterans	DEC 2001
52.222-36	Affirmative Action For Workers With Disabilities	JUN 1998
52.222-37	Employment Reports On Special Disabled Veterans, Veterans Of The Vietnam Era, and Other Eligible Veterans	DEC 2001
52.223-6	Drug-Free Workplace	MAY 2001
52.223-14	Toxic Chemical Release Reporting	AUG 2003
52.227-1 Alt I	Authorization And Consent (Jul 1995) - Alternate I	APR 1984
52.227-2	Notice And Assistance Regarding Patent And Copyright Infringement	AUG 1996
52.229-3	Federal, State And Local Taxes	APR 2003
52.232-1	Payments	APR 1984
52.232-8	Discounts For Prompt Payment	FEB 2002
52.232-9	Limitation On Withholding Of Payments	APR 1984
52.232-11	Extras	APR 1984
52.232-17	Interest	JUN 1996
52.232-23	Assignment Of Claims	JAN 1986
52.232-25	Prompt Payment	OCT 2003
52.232-33	Payment by Electronic Funds Transfer--Central Contractor Registration	OCT 2003

52.233-1	Disputes	JUL 2002
52.233-3	Protest After Award	AUG 1996
52.233-4	Applicable Law for Breach of Contract Claim	OCT 2004
52.242-13	Bankruptcy	JUL 1995
52.243-1 Alt V	Changes--Fixed-Price (Aug 1987) - Alternate V	APR 1984
52.244-5	Competition In Subcontracting	DEC 1996
52.244-6	Subcontracts for Commercial Items	FEB 2006
52.245-2	Government Property (Fixed Price Contracts)	MAY 2004
52.246-23	Limitation Of Liability	FEB 1997
52.249-2	Termination For Convenience Of The Government (Fixed-Price)	MAY 2004
52.249-8	Default (Fixed-Price Supply & Service)	APR 1984
52.249-9	Default (Fixed-Priced Research And Development)	APR 1984
52.252-6	Authorized Deviations In Clauses	APR 1984
52.253-1	Computer Generated Forms	JAN 1991
252.203-7001	Prohibition On Persons Convicted of Fraud or Other Defense-Contract-Related Felonies	DEC 2004
252.204-7002	Payment For Subline Items Not Separately Priced	DEC 1991
252.204-7003	Control Of Government Personnel Work Product	APR 1992
252.204-7004 Alt A	Central Contractor Registration (52.204-7) Alternate A	NOV 2003
252.209-7004	Subcontracting With Firms That Are Owned or Controlled By The Government of a Terrorist Country	MAR 1998
252.225-7001	Buy American Act And Balance Of Payments Program	JUN 2005
252.225-7002	Qualifying Country Sources As Subcontractors	APR 2003
252.225-7012	Preference For Certain Domestic Commodities	JUN 2004
252.225-7013	Duty-Free Entry	JUN 2005
252.225-7014 Alt I	Preference For Domestic Specialty Metals (Jun 2005) - Alternate I	APR 2003
252.225-7021	Trade Agreements	FEB 2006
252.227-7013	Rights in Technical Data--Noncommercial Items	NOV 1995
252.227-7016	Rights in Bid or Proposal Information	JUN 1995
252.227-7030	Technical Data--Withholding Of Payment	MAR 2000
252.227-7037	Validation of Restrictive Markings on Technical Data	SEP 1999
252.232-7003	Electronic Submission of Payment Requests	JAN 2004
252.232-7010	Levies on Contract Payments	SEP 2005
252.235-7011	Final Scientific or Technical Report	NOV 2004
252.243-7001	Pricing Of Contract Modifications	DEC 1991
252.243-7002	Requests for Equitable Adjustment	MAR 1998
252.244-7000	Subcontracts for Commercial Items and Commercial Components (DoD Contracts)	NOV 2005
252.247-7023	Transportation of Supplies by Sea	MAY 2002

CLAUSES INCORPORATED BY FULL TEXT

52.219-8 UTILIZATION OF SMALL BUSINESS CONCERNS (MAY 2004)

(a) It is the policy of the United States that small business concerns, veteran-owned small business concerns, service-disabled veteran-owned small business concerns, HUBZone small business concerns, small disadvantaged business concerns, and women-owned small business concerns shall have the maximum practicable opportunity to participate in performing contracts let by any Federal agency, including contracts and subcontracts for subsystems, assemblies, components, and related services for major systems. It is further the policy of the United States that its

prime contractors establish procedures to ensure the timely payment of amounts due pursuant to the terms of their subcontracts with small business concerns, veteran-owned small business concerns, service-disabled veteran-owned small business concerns, HUBZone small business concerns, small disadvantaged business concerns, and women-owned small business concerns.

(b) The Contractor hereby agrees to carry out this policy in the awarding of subcontracts to the fullest extent consistent with efficient contract performance. The Contractor further agrees to cooperate in any studies or surveys as may be conducted by the United States Small Business Administration or the awarding agency of the United States as may be necessary to determine the extent of the Contractor's compliance with this clause.

Definitions. As used in this contract--

HUBZone small business concern means a small business concern that appears on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration.

Service-disabled veteran-owned small business concern--

(1) Means a small business concern--

(i) Not less than 51 percent of which is owned by one or more service-disabled veterans or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more service-disabled veterans; and

(ii) The management and daily business operations of which are controlled by one or more service-disabled veterans or, in the case of a service-disabled veteran with permanent and severe disability, the spouse or permanent caregiver of such veteran.

(2) Service-disabled veteran means a veteran, as defined in 38 U.S.C. 101(2), with a disability that is service-connected, as defined in 38 U.S.C. 101(16).

Small business concern means a small business as defined pursuant to Section 3 of the Small Business Act and relevant regulations promulgated pursuant thereto.

Small disadvantaged business concern means a small business concern that represents, as part of its offer that--

(1) It has received certification as a small disadvantaged business concern consistent with 13 CFR part 124, subpart B;

(2) No material change in disadvantaged ownership and control has occurred since its certification;

(3) Where the concern is owned by one or more individuals, the net worth of each individual upon whom the certification is based does not exceed $750,000 after taking into account the applicable exclusions set forth at 13 CFR 124.104(c)(2); and

(4) It is identified, on the date of its representation, as a certified small disadvantaged business in the database maintained by the Small Business Administration (PRO-Net).

Veteran-owned small business concern means a small business concern--

(1) Not less than 51 percent of which is owned by one or more veterans (as defined at 38 U.S.C. 101(2)) or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more veterans; and

(2) The management and daily business operations of which are controlled by one or more veterans.

Women-owned small business concern means a small business concern--

(1) That is at least 51 percent owned by one or more women, or, in the case of any publicly owned business, at least 51 percent of the stock of which is owned by one or more women; and

(2) Whose management and daily business operations are controlled by one or more women.

(d) Contractors acting in good faith may rely on written representations by their subcontractors regarding their status as a small business concern, a veteran-owned small business concern, a service-disabled veteran-owned small business concern, a HUBZone small business concern, a small disadvantaged business concern, or a women-owned small business concern.

(End of clause)

52.252-2 CLAUSES INCORPORATED BY REFERENCE (FEB 1998)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also, the full text of a clause may be accessed electronically at this/these address(es):

http://farsite.hill.af.mil

(End of clause)

CAR-I10 AUTHORIZED CHANGES ONLY BY THE CONTRACTING OFFICER (JUN 1996) (NSWCCD)

(a) Except as specified in paragraph (b) below, no order, statement, or conduct of Government personnel who visit the Contractor's facilities or in any other manner communicates with Contractor personnel during the performance of this contract shall constitute a change under the "Changes" clause of this contract.

(b) The Contractor shall not comply with any order, direction or request of Government personnel unless it is issued in writing and signed by the Contracting Officer, or is pursuant to specific authority otherwise included as a part of this contract.

(c) The Contracting Officer is the only person authorized to approve changes in any of the requirements of this contract and notwithstanding provisions contained elsewhere in this contract, the said authority remains solely the Contracting Officer's. In the event the contractor effects any change at the direction of any person other than the Contracting Officer, the change will be considered to have been made without authority and no adjustment will be made in the contract price to cover any increase in charges incurred as a result thereof. The address and telephone number of the Contracting Officer is:
NAME Robert Colot
ADDRESS Naval Surface Warfare Center, Carderock Division 5001 South Broad Street
Philadelphia, PA 19112-1403
TELEPHONE (215) 897-7060

Section J - List of Documents, Exhibits and Other Attachments

LIST OF ATTACHMENTS/EXHIBITS

Attachment 1 – General Assembly Drawings for Bleed Air Cooler

Section K - Representations, Certifications and Other Statements of Offerors

CLAUSES INCORPORATED BY REFERENCE

252.209-7001	Disclosure of Ownership or Control by the Government of a Terrorist Country	SEP 2004
252.225-7031	Secondary Arab Boycott Of Israel	JUN 2005
252.227-7028	Technical Data or Computer Software Previously Delivered to the Government	JUN 1995

CLAUSES INCORPORATED BY FULL TEXT

52.204-8 ANNUAL REPRESENTATIONS AND CERTIFICATIONS (JAN 2006)

(a)(1) The North American Industry Classification System (NAICS) code for this acquisition is 332410

(2) The small business size standard is 500 Employees.

(3) The small business size standard for a concern which submits an offer in its own name, other than on a construction or service contract, but which proposes to furnish a product which it did not itself manufacture, is 500 employees.

(b)(1) If the clause at 52.204-7, Central Contractor Registration, is included in this solicitation, paragraph (c) of this provision applies.

(2) If the clause at 52.204-7 is not included in this solicitation, and the offeror is currently registered in CCR, and has completed the ORCA electronically, the offeror may choose to use paragraph (b) of this provision instead of completing the corresponding individual representations and certifications in the solicitation. The offeror shall indicate which option applies by checking one of the following boxes:

(__) Paragraph (c) applies.

(__) Paragraph (c) does not apply and the offeror has completed the individual representations and certifications in the solicitation.

(c) The offeror has completed the annual representations and certifications electronically via the Online Representations and Certifications Application (ORCA) website at http://orca.bpn.gov. After reviewing the ORCA database information, the offeror verifies by submission of the offer that the representations and certifications currently posted electronically have been entered or updated within the last 12 months, are current, accurate, complete, and applicable to this solicitation (including the business size standard applicable to the NAICS code referenced for this solicitation), as of the date of this offer and are incorporated in this offer by reference (see FAR 4.1201); except for the changes identified below [offeror to insert changes, identifying change by clause number, title, date]. These amended representation(s) and/or certification(s) are also incorporated in this offer and are current, accurate, and complete as of the date of this offer.

FAR Clause	Title	Date	Change
------	---------	------	------

Any changes provided by the offeror are applicable to this solicitation only, and do not result in an update to the representations and certifications posted on ORCA.

(End of Provision)

252.225-7000 BUY AMERICAN ACT--BALANCE OF PAYMENTS PROGRAM CERTIFICATE (JUN 2005)

(a) Definitions. Domestic end product, foreign end product, qualifying country, qualifying country end product, and United States have the meanings given in the Buy American Act and Balance of Payments Program clause of this solicitation.

(b) Evaluation. The Government--

(1) Will evaluate offers in accordance with the policies and procedures of Part 225 of the Defense Federal Acquisition Regulation Supplement; and

(2) Will evaluate offers of qualifying country end products without regard to the restrictions of the Buy American Act or the Balance of Payments Program.

(c) Certifications and identification of country of origin.

(1) For all line items subject to the Buy American Act and Balance of Payments Program clause of this solicitation, the offeror certifies that--

(i) Each end product, except those listed in paragraph (c)(2) or (3) of this provision, is a domestic end product; and

(ii) Components of unknown origin are considered to have been mined, produced, or manufactured outside the United States or a qualifying country.

(2) The offeror certifies that the following end products are qualifying country end products:

(Line Item Number Country of Origin)

(Country of Origin)

(3) The following end products are other foreign end products:

(Line Item Number)

(Country of Origin) (If known)

(End of provision)

252.247-7022 REPRESENTATION OF EXTENT OF TRANSPORTATION BY SEA (AUG 1992)

(a) The Offeror shall indicate by checking the appropriate blank in paragraph (b) of this provision whether transportation of supplies by sea is anticipated under the resultant contract. The term supplies is defined in the Transportation of Supplies by Sea clause of this solicitation.

(b) Representation. The Offeror represents that it:

____ (1) Does anticipate that supplies will be transported by sea in the performance of any contract or subcontract resulting from this solicitation.

____ (2) Does not anticipate that supplies will be transported by sea in the performance of any contract or subcontract resulting from this solicitation.

(c) Any contract resulting from this solicitation will include the Transportation of Supplies by Sea clause. If the Offeror represents that it will not use ocean transportation, the resulting contract will also include the Defense FAR Supplement clause at 252.247-7024, Notification of Transportation of Supplies by Sea.

(End of provision)

CAR-K01 ELECTRONIC DISTRIBUTION OF CONTRACT DOCUMENTS (NOV 2000)

(a) The Navy Air Force Interface (NAFI) provides World Wide Web access to documents used to support the procurement, contract administration, bill paying, and accounting processes. NAFI is being used by the Naval Surface Warfare Center, Carderock Division to electronically distribute all contract award and contract modification documents, including task and delivery orders. The contractor's copy will be provided in portable document format (pdf) as an attachment to an e-mail that will be sent to the contractor by the NAFI system. A pdf file may be accessed using Adobe Acrobat Reader which is a free software that may be downloaded at http://www.adobe.com/products/acrobat/readstep.html.

(b) Offerors must provide the following information that will be used to make electronic distribution for any resultant contract.

Name of Point of Contact_____

Phone Number for Point of Contact _____

E-mail Address for Receipt of Electronic Distribution _____

Section L - Instructions, Conditions and Notices to Bidders

CLAUSES INCORPORATED BY REFERENCE

52.215-1	Instructions to Offerors--Competitive Acquisition	JAN 2004
52.252-1	Solicitation Provisions Incorporated By Reference	FEB 1998

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52.211-14 NOTICE OF PRIORITY RATING FOR NATIONAL DEFENSE USE (SEP 1990)

Any contract awarded as a result of this solicitation will be DX rated order; X DO rated order certified for national defense use under the Defense Priorities and Allocations System (DPAS) (15 CFR 700), and the Contractor will be required to follow all of the requirements of this regulation.

(End of provision)

52.216-1 TYPE OF CONTRACT (APR 1984)

The Government contemplates award of a firm fixed-price (FFP) contract resulting from this solicitation.

(End of clause)

52.233-2 SERVICE OF PROTEST (AUG 1996)

(a) Protests, as defined in section 33.101 of the Federal Acquisition Regulation, that are filed directly with an agency, and copies of any protests that are filed with the General Accounting Office (GAO), shall be served on the Contracting Officer by obtaining written and dated acknowledgment of receipt from NSWCCD (Robert Colot Code 3352) 5001 South Broad Street Philadelphia, PA 19112-5083.

(b) The copy of any protest shall be received in the office designated above within one day of filing a protest with the GAO.

(End of provision)

52.252-1 SOLICITATION PROVISIONS INCORPORATED BY REFERENCE (FEB 1998)

This solicitation incorporates one or more solicitation provisions by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. The offeror is cautioned that the listed provisions may include blocks that must be completed by the offeror and submitted with its quotation or offer. In lieu of submitting the full text of those provisions, the offeror may identify the provision by paragraph identifier and provide the appropriate information with its quotation or offer. Also, the full text of a solicitation provision may be accessed electronically at this/these address(es):

http://farsite.hill.af.mil

(End of provision)

52.252-5 AUTHORIZED DEVIATIONS IN PROVISIONS (APR 1984)

(a) The use in this solicitation of any Federal Acquisition Regulation (48 CFR Chapter 1) provision with an authorized deviation is indicated by the addition of"(DEVIATION)" after the date of the provision.

(b) The use in this solicitation of any DFARS (48 CFR Chapter DFARS) provision with an authorized deviation is indicated by the addition of "(DEVIATION)" after the name of the regulation.

(End of provision)

CAR-L02 SINGLE AWARD FOR ALL ITEMS (JUN 1996) (NSWCCD)

Due to the interrelationship of supplies and/or services to be provided hereunder, the Government reserves the right to make a single award to the offeror whose offer is considered in the best interest of the Government, price and other factors considered. Therefore, offerors proposing less than the entire effort specified herein may be determined to be unacceptable.

CAR-L11 PROPOSAL PREPARATION REQUIREMENT (JUL 2002) (NSWCCD)

It is requested that offerors prepare their proposals in accordance with the following organization, content and format requirements to assist the government in making a complete and thorough evaluation of all proposals. Proposals shall be submitted as three separate documents, as follows:

Documents	Original	Copies
Solicitation, Offer and Award Document (SF-33)	1	2
Technical Proposal	1	5

The “originals” shall be clearly identified as the “ORIGINAL”, and bear the original signature(s) of the offeror. The “copies” shall be complete and clearly identified as “COPY” or “DUPLICATE”.

In order to facilitate the evaluation process, it is requested that offerors also submit their cost proposal spreadsheets on diskette (in addition to the hard copy requirements stated above). Diskettes shall be in 3.5 inch, high density format, and it is requested that the spreadsheet files be compatible with Windows 95 Version 4.0, Excel 97 Version 8.0. The provision of these spreadsheet files on diskette in no way relinquishes the offeror's responsibility to provide hard copies of the cost proposal.

(1) SOLICITATION, OFFER AND AWARD DOCUMENTS (SF-33 RFP)

This document, which may be used as part of the contract award document, shall be fully executed and returned as a separate document from the technical and cost proposals. Special attention should be taken to accurately enter the prices required in Section B, complete all Representations and Certifications in Section K and ensure that an authorized person signs the offer in Block 17 of Page 1.

The document SHALL NOT be embellished with any cover or binding. If the offeror makes any qualifications to any provisions in the RFP, all such qualifications shall be listed in a cover letter to the proposal. Qualifications may also be annotated on the Solicitation, Offer and Award document, if such annotation is necessary to clarify the qualifications.

(2) TECHNICAL PROPOSAL

The technical/management proposal should be written so that management and engineering oriented personnel can make a thorough evaluation and arrive at a sound determination as to whether the proposal meets the requirements of this solicitation. To this end, the technical proposal shall be so specific, detailed and complete as to clearly and fully demonstrate that the prospective contractor has a thorough understanding of the technical requirements contained in Section C of this solicitation.

Statements such as "the offeror understands," "will comply with the statement of work," "standard procedures will be employed," "well known techniques will be used" and general paraphrasing of the statement of work are considered inadequate. The technical proposal must provide details concerning what the contractor will do and how it will be done. This includes a full explanation of the techniques, disciplines, and procedures proposed to be followed.

The technical proposal shall not contain any reference to cost; however, information concerning labor allocation and categories, consultants, travel, materials, equipment and any information of interest to technical reviewers shall be contained in the technical proposal in sufficient detail so that the offeror's understanding of the scope of the work may be adequately evaluated. The technical proposal shall be page numbered, contain a table of contents, be organized in the following four (4) sections, and shall address in detail the following information:

(1) Management Approach: Offerors should provide a Technical Understanding/Approach Summary addressing how the offeror will combine heat pipe technology with existing military heat exchanger designs to produce a prototype heat pipe/bleed air cooler heat exchanger. The summary should describe the modeling techniques and design elements the offeror will use to create a heat exchanger meeting the performance specifications identified in the Statement of Work.

(2) Personnel Qualifications: Offerors are required to submit concise resumes for key personnel (as identified below) to be assigned to the proposed contract. Resumes should include the relevant qualifications, background and experience for all such key personnel in sufficient detail to demonstrate the capability of such personnel to accomplish the work described in the Statement of Work. Following are the required levels of education and experience for key personnel assigned to this contract.

(3)

Advanced Thermal Engineer/Designer: Required minimum qualifications - B.S. degree and four years experience in preliminary design development and systems specification in the thermal engineering field.

Technology Manager: Required minimum qualifications – a B.S. degree and four years experience in technology fabrication. Must possess a thorough understanding of the business practices and the technology required to complete an advanced thermal design.

(4) Corporate Experience: Offerors shall provide a short summary of relevant corporate experience in Advanced thermal design. State-of-the-art design/fabrication work will be viewed particularly favorably, such as experience gained in research programs such the DARPA (Defense Advanced Research Projects Agency), SBIR (Small Business Innovation Research) and STTR (Small Business Technology Transfer) programs. The offeror may include Federal, State and Local Government and

private sector contracts. Offerors that represent newly formed entities, without prior contract experience, should identify previous contract and subcontract experience for all key personnel identified in the proposal. Offerors will be evaluated based on the extent and quality of the offeror's recent experience in efforts similar (in size and scope) to the work required by the SOW.

(5) Past Performance: Offerors should provide the following information about two (2) contracts or subcontracts currently active or completed within the last two years:

(6) Name of Contracting Activity
(7) Contract Number
(8) Contract Type
(9) Type of Work (short summary-200 words or less)
(10) Name of Contracting Officer and Phone Number
(11) Name of Technical POC and phone number

Offerors' past performance will be evaluated for conformance to specifications; standards of good workmanship; history of containing and forecasting costs; adherence to contract schedule; history of reasonable and cooperative behavior; and commitment to providing quality service at fair and reasonable prices. In evaluating offerors under this factor, the Government is not limited to the information provided by the offeror and may obtain information from other sources, such as the CPARS system or small business office records.

Offerors shall receive credit for good past performance and lose credit for poor past performance. Offerors lacking relevant past experience history will receive a neutral rating for past performance.

Incomplete data may not be considered.

Section M - Evaluation Factors for Award

EVALUATION FACTORS
Award will be made based on a technically acceptable, low cost basis.

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Evaluation of Proposals

(2) **General.** Careful, full and impartial consideration will be given to all offers received pursuant to this solicitation, and the evaluation will be applied in a similar manner. Factors against which offers will be evaluated are set forth below and parallel the solicitation response called for elsewhere herein.

Technical / Management Approach
Personnel Qualifications
Corporate Experience
Past Performance

(b) **Initial Evaluation of Offers**. All offers received will be evaluated by a team of Government personnel.

(c) **Evaluation Approach.** The following evaluation approach will be used:

(3) *Technical Proposal*. All evaluation factors will be reviewed and each proposal will be determined to be technically acceptable or unacceptable.

(2) *Price Proposal*.

(i) Cost or Price will be evaluated for magnitude and realism. The determination of the magnitude of the cost proposal will be based on the total of all proposed costs.

(ii) Proposals which are unrealistic in terms of technical or schedule commitments or unrealistically high or low in cost may be deemed reflective of an inherent lack of technical competence, or indicative of a failure to comprehend the complexity and risks of the proposed work, and may be grounds for rejection of the proposal. If the proposed contract requires the delivery of data, the quality of organization and writing reflected in the proposal will be considered to be an indication of the quality of organization and writing which would be prevalent in the proposed deliverable data. Subjective judgment on the part of the Government evaluators is implicit in the entire process. Throughout the evaluation, the Government will consider "correction potential" when a deficiency is identified**.**

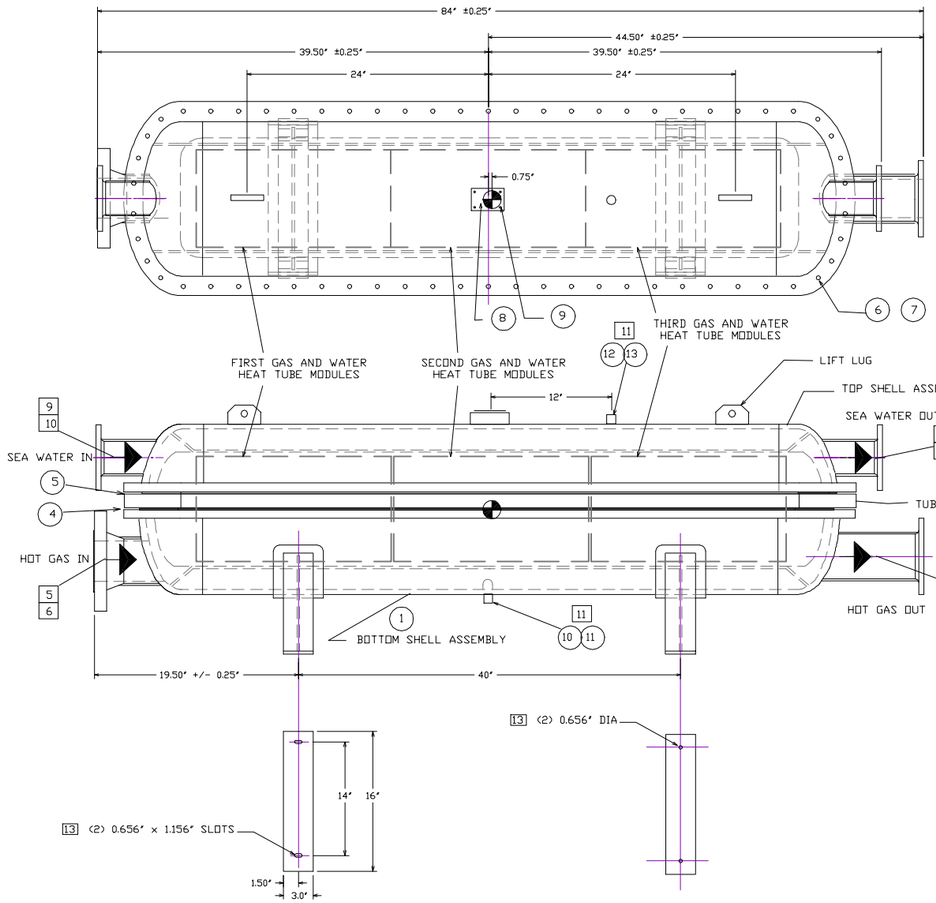
(d) **Competitive Acquisition Instructions**.

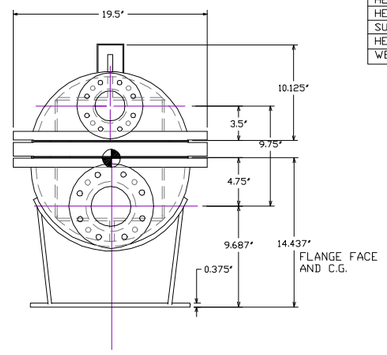
(1) If the provision FAR 52.215-1, "Instructions To Offerors--Competitive Acquisition" is included in Section L of this solicitation, the Government intends to evaluate proposals and award a contract without discussions with offerors (except clarifications as described in FAR 15.306(a)). Therefore, the offeror's initial proposal should contain the offeror's best terms from a cost or price and technical standpoint. However, the Government reserves the right to conduct discussions if the Contracting Officer later determines them to be necessary.
(2) If the provision at FAR 52.215-1 is used with its Alternate I, the Government intends to evaluate proposals and award a contract after conducting discussions with offerors whose proposals have been determined to be in the competitive range.
(3) In either of the above two situations, if the Contracting Officer determines that the number of proposals that would otherwise be in the competitive range exceeds the number at which an efficient competition can be conducted,

the Contracting Officer may limit the number of proposals in the competitive range to the greatest number that will permit an efficient competition among the most highly rated proposals.

(e) **Basis for Contract Award**. Award will be made to the offeror who submits the lowest priced technically acceptable proposal.

ZONE	REV	DESCRIPTION	DATE	APPROVED





PERFORMANCE DATA		
CHARACTERISTICS	SHELL SIDE	TUBE SIDE
FLUID CIRCULATED	AIR (2450 SCFM)	SEA WATER
FLOW RATE LB/HR	11,231	46,350
INLET TEMPERATURE °F	925	85
OUTLET TEMPERATURE °F	***	***
PRESSURE DROP (ALLOW/CALC) PSI	***/***	***
VELOCITY AT INLET FLANGE FT/SEC	198.9	4.14
VELOCITY INTERNAL FT/SEC	***	***
NUMBER OF PASSES	1	1
DESIGN PRESSURE PSIG	100	50
TEST PRESSURE PSIG	150	100
DESIGN TEMPERATURE °F	925	300
LOG MEAN TEMPERATURE DIFFERENTIAL (LMTD) °F	***	
HEAT TRANSFER RATE SERVICE BTU/HR/SQ FT/°F	***	
HEAT TRANSFER RATE CLEAN BTU/HR/SQ FT/°F	***	
SURFACE AREA SQ FT	***	
HEAT EXCHANGE BTU/HR (APPROX)	***	
WEIGHT DRY/FULL OF WATER LBS	2000/***	

NOTES: UNLESS OTHERWISE SPECIFIED
1. INTERPRET DRAWING IN ACCORDANCE WITH DOD-STD-100.
2. UNIT DESIGN AND FABRICATION IS IN ACCORDANCE WITH MIL-C-19713, CLASS 2, EXCEPT MATERIAL REQUIREMENTS OF CLASS 1 APPLY.
3. WELD PER MIL-STD-278F, CLASS A-2 HOT AIR SIDE AND A-4 SEA WATER SIDE.
4. MATERIAL: SEE PARTS LIST.
5. AIR INLET FLANGE GASKET SURFACE MEETS BOTH GENERAL NOTES 13(A)(1) AND 13(C)(1) OF MIL-STD-777C.
6. AIR INLET FLANGE MATES WITH 4"-300# RAISED FACE ASME B16.5 FLANGE.
7. AIR OUTLET FLANGE GASKET SURFACE MEETS GENERAL NOTE 13(A)(1) OF MIL-STD-777C.
8. AIR OUTLET FLANGE MATES WITH 4"-150# FLAT FACE MIL-F-20042, FIG. 2 FLANGE.
9. SEA WATER INLET AND OUTLET FLANGE GASKET SURFACES MEET GENERAL NOTE 13(A)(1) OF MIL-STD-777C.
10. SEA WATER INLET AND OUTLET FLANGES MATE WITH 3"-150# FLAT FACE MIL-F-20042, FIG. 2 FLANGES.
11. AIR CONDENSATE DRAIN AND SEA WATER VENT MEETS REQUIREMENTS FOR 7/8"-14UNF-2B PER MS16142 AND MS18229.
12. LIFT ABOVE CENTER OF GRAVITY WITH DOUBLE SLING EQUALLY SPACED TO EACH SIDE.
13. FOUNDATION BOLTING SHALL BE IN ACCORDANCE WITH MIL-S-1222, GRADE 5 OR 8-AISI 10XXX SERIES (<.55 MAX. CARBON)

FIND NO.	QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	DESCRIPTION	MATERIAL	SPECIFICATION	WGT
13	1	78730	MS28778-10	O RING, SEA WATER VENT	BUNA-N	MIL-P-5510	
12	1	78730	MS18229-10	PLUG, STRT THRD, O RING SEAL	70/30 CU NI	MIL-C-15726	
11	1	78730	MS83248/2-116	O RING, AIR CONDENSATE DRAIN	FLUORO-CARBON	MIL-R-83248	
10	1	78730	MS18229-10	PLUG, STRT THRD, O RING SEAL	CRES	T304	
9	4	78730	MS21318-14	SCREW, DRIVE, ROUND HEAD	CRES 18-8	FF-S-107 TYPE U	
8	1	78730	D2800	PLATE, IDENTIFICATION	BRASS	QQ-B-613	
7	124	78730	D2800	NUT, HEX, FINISHED	MONEL	QQ-N-281(B)	
6	62	78730	D2800	STUD CONTINUOUS THREAD	MONEL	QQ-N-281(A)	
5	1	78730	D2800	GASKET SEA WATER SIDE	MONEL, GRAPHITE	GARLOCK STYLE 601 CORRAGRAPH	
4	1	78730	D2800	GASKET AIR SIDE	MONEL, GRAPHITE	GARLOCK STYLE 601 CORRAGRAPH	
3	1	78730	D2798	UPPER SHELL ASSEMBLY	C-71500 70/30 CU NI	--	480
2	1	78730	D2799	TUBE SHEET	C-71500 70/30 CU NI	--	845
1	1	78730	D2797	LOWER SHELL ASSEMBLY	CRES	T304	675
	1	78730	D2796	COOLER, BLEED AIR, ASSEMBLY	--	--	2000

PARTS LIST

TOLERANCE FOR DIMENSIONS EXCEPT FINISHED SURFACES HOLE PATTERNS
FRACTIONAL: ±1/8
ANGULAR : ±1/2°

CONTRACT NO.
N65540-03-C-0065

APPROVALS	DATE
J E LOGAN	5/26/04
DO NOT SCALE DWG	

[redacted]

425 kW MOND-HEIGHT HEAT PIPE
HOT GAS TO WATER HEAT EXCHANGER
BLEED AIR COOLER ASSEMBLY

SIZE	CODE IDENT NO.	DWG NO.	REV
C	78730	D2796	-
SCALE NONE		SHEET 1 OF 1	

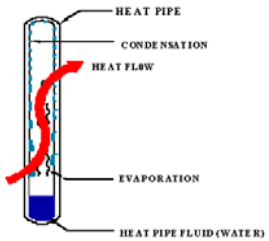
TECHNICAL PROGRESS

Two Phase Heat Transfer via Heat Pipe Technology

425kW Heat Pipe Bleed Air Cooler

OPERATION

- Heat from source evaporates liquid, thus removing heat
- Vapor rises to top of pipe and cools

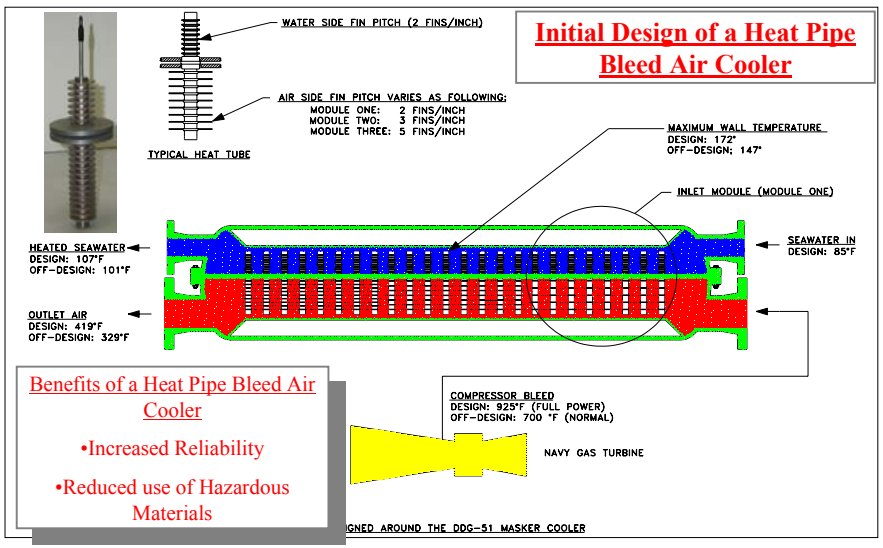


PROBLEM

High-temperature heat exchangers on ships generate scaling which results from the reduced solubility of calcareous salts at wall temperatures above 150°F.

SOLUTION

By using ***heat pipes*** to control the saltwater side wall temperature below 150°F, scaling and cleaning with hazardous materials is avoided and reliability is increased.



Initial Design of a Heat Pipe Bleed Air Cooler

Benefits of a Heat Pipe Bleed Air Cooler

- Increased Reliability
- Reduced use of Hazardous Materials

Installation of Cooler Technology on DDG-61

MANFACTURING & JOINING ISSUES

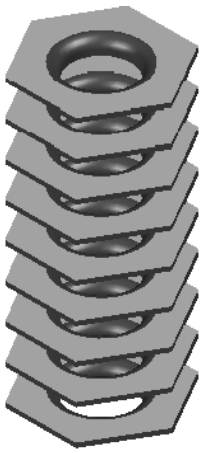
- NSWC target cost for production of heat pipe cooler is < $50K
- Tube-Sheet Distortion Control
- Single All brazed assembly
- Automated Lathe Welding
- Automated Orbital GTAW or Laser Welding
- Thermionic Cleaning
- Integral heat pipe & fin assembly

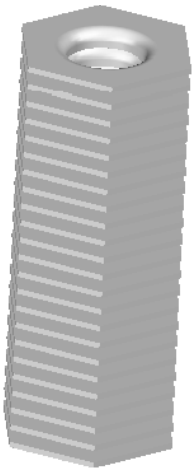
The Navy Joining Center
Managed by EWI and part of
EWI WeldNet® Welding and Joining Information Network

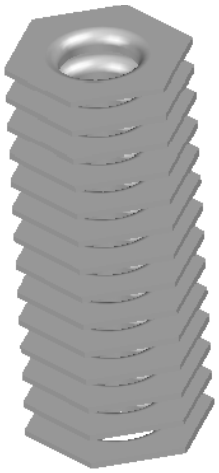
Prototype 425 kW, MASKER Cooler, To be demonstrated on a DDG-51 Class Ship

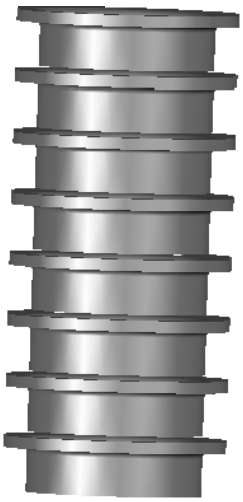
TECHNICAL PROGRESS

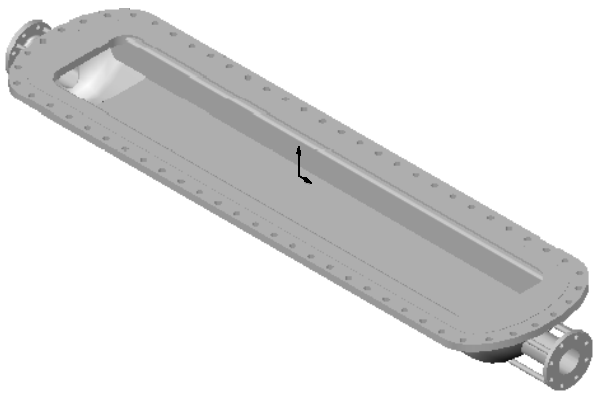
Module:1,2 &3 (65HP/module)	Module:1,2& 3 (2 fins/inch)	Module-1 at (2fin/in)	Module-2 at (3fin/in)	Module-3 at (5fin/in)
Total –195 HP	Tota:1,560 fins	Total 585 fins	Total 910 fins	Total 1495fins
195 HP	**4,550 Air & Water fins**			

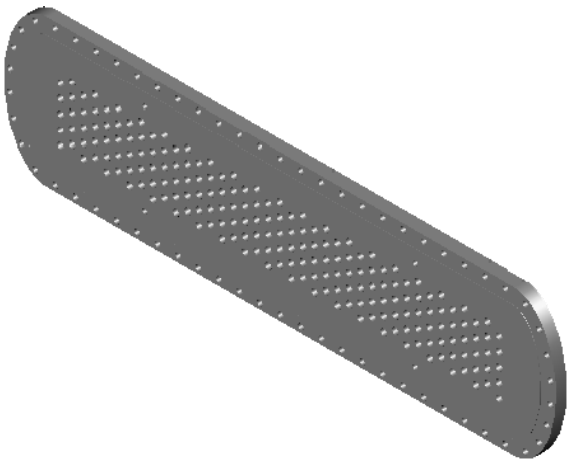


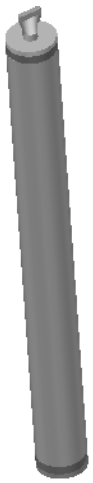


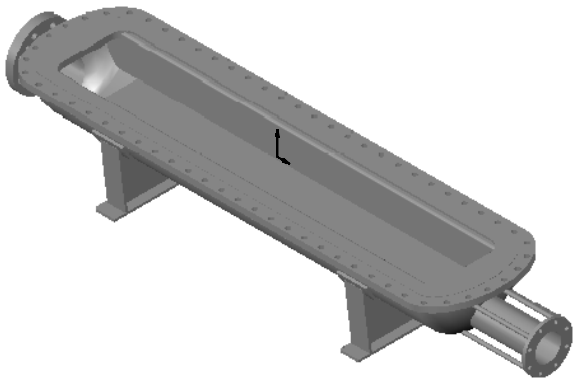








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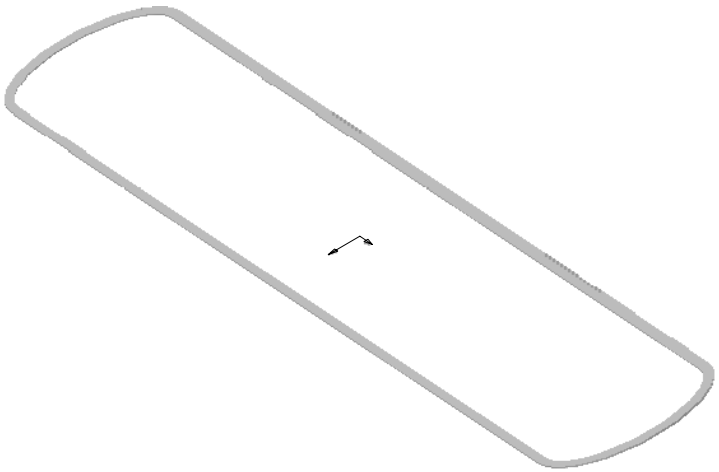
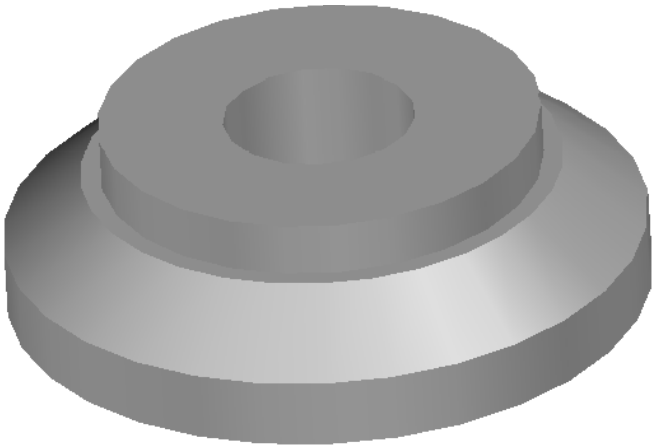
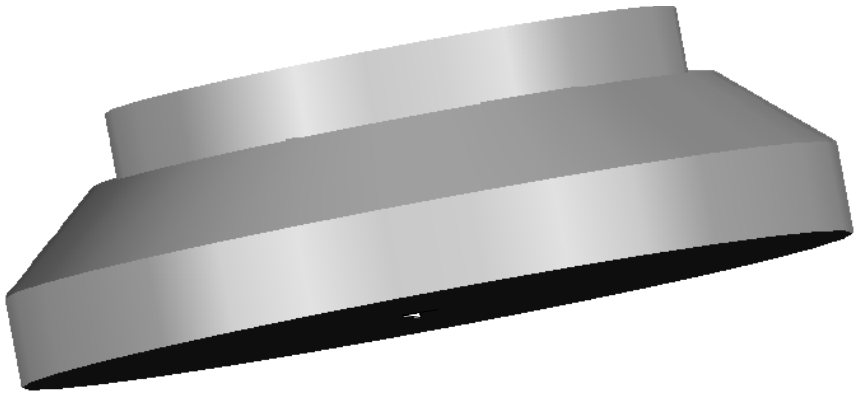
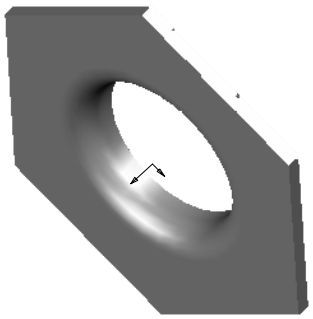
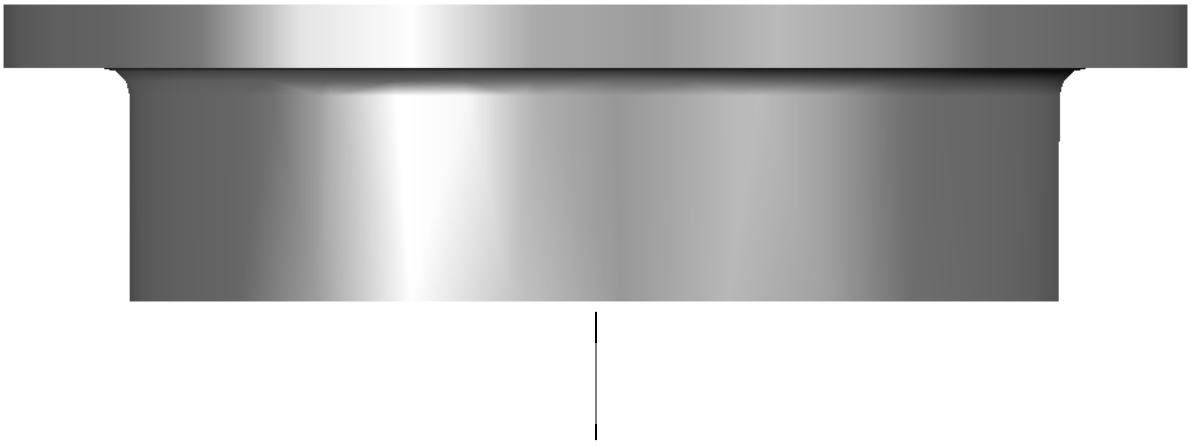


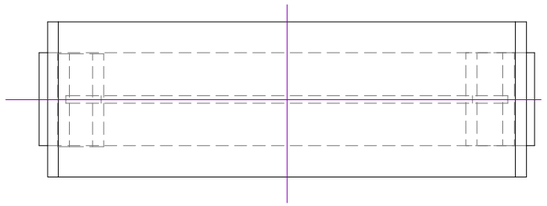


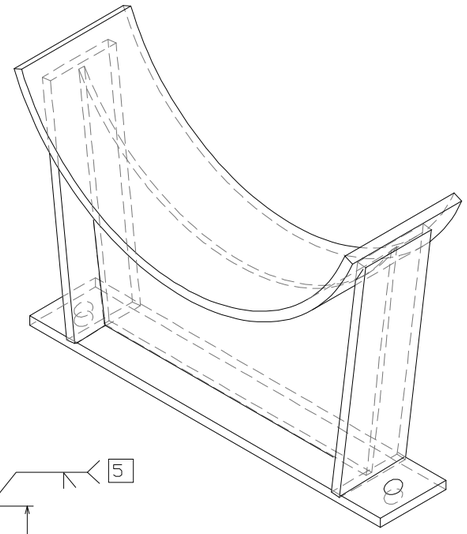




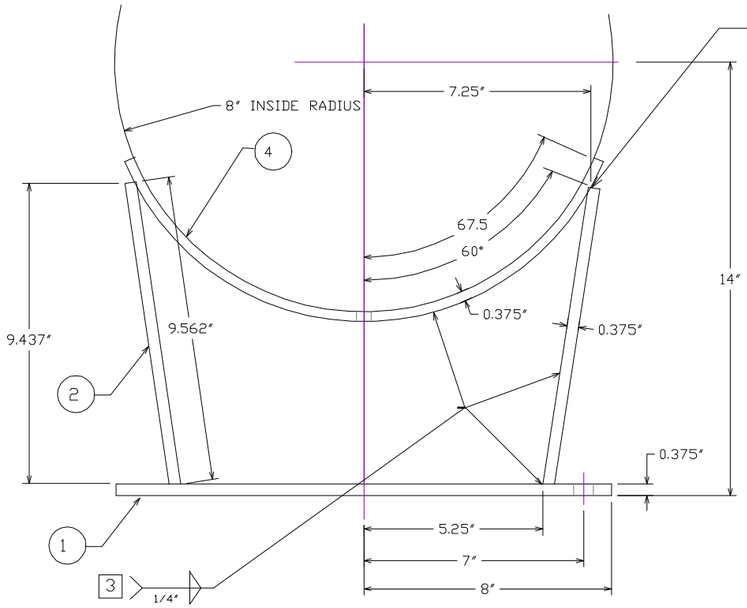


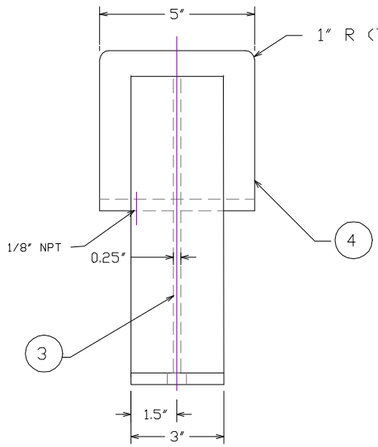
REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED





21/32" DIA HOLES FOR 5/8" DIA BOLTS
(2 PLACES) ON SUPPORT 1.
21/32" X 1-5/32" SLOTS (2 PLACES) FOR
5/8" ANCHOR BOLTS ON SUPPORT 2.





NOTES: UNLESS OTHERWISE SPECIFIED
1. INTERPRET DRAWINGS IN ACCORDANCE WITH DOD-STD-100.
2. BREAK ALL SHARP CORNERS AND EDGES 0.030" TO 0.050"
3. WELD PER WIEGMANN & ROSE WELD PROCEDURE NO. 47 SMAW, OR NO.97 GMAW, CARBON STEEL TO CARBON STEEL.
4. MATERIAL: SEE PARTS LIST.
5. WELD PER WIEGMANN & ROSE WELD PROCEDURE NO. 24 SMAW, HIGH ALLOY STEEL TO CARBON STEEL.
6. THOROUGHLY CLEAN CARBON STEEL SURFACES. APPLY TWO COATS OF ALUMINUM HI-HEAT PRIMER IN ACCORDANCE WITH TT-P-28.
7. ANCHOR BOLTS 5/8-11 UNC-2A MATERIAL: 10XXX SERIES (0.55 MAX CARBON), MIL-S-1222, GRADE 5 OR 8.

FIND NO.	QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	DESCRIPTION	MATERIAL	SPECIFICATION	WGT
1	2	78730	BASE PLATE	3/8" THICK	CARBON STEEL	A-36	-
2	4	78730	SIDE PLATE	3/8" THICK	CARBON STEEL	A-36	-
3	2	78730	WEB	1/4" THICK	CARBON STEEL	A-36	-
4	2	78730	SADDLE PLATE	3/8" THICK	304SS	A-240	-

PARTS LIST

TOLERANCE FOR DIMENSIONS EXCEPT FINISHED SURFACES HOLE PATTERNS

FRACTIONAL: ±1/8

ANGULAR : ±1/2°

CONTRACT NO. N65540-03-C-0065

APPROVALS	DATE
J E LOGAN	5/26/04
DO NOT SCALE DWG	

WIEGMANN & ROSE

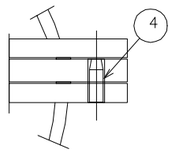
425 kW MONO-HEIGHT HEAT PIPE
HOT GAS TO WATER HEAT EXCHANGER
SADDLE SUPPORT

SIZE	CODE IDENT NO.	DWG NO.	REV
C	78730	D2801	-

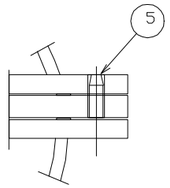
SCALE NONE SHEET 1 OF 1

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

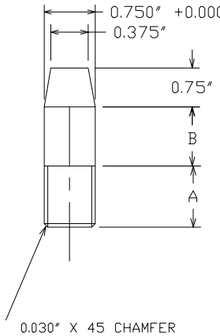
DOWEL PIN	A	B	DRILL 0.781"DIA THRU	DRILL & TAP 3/4"- 10UNC THRU
FIND NO.4	1.000"	0.625"	TUBESHEET	LOWER FLANGE
FIND NO.5	1.375"	0.250"	UPPER FLANGE	TUBESHEET

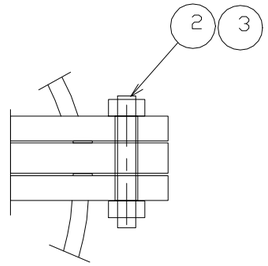


DETAIL 2

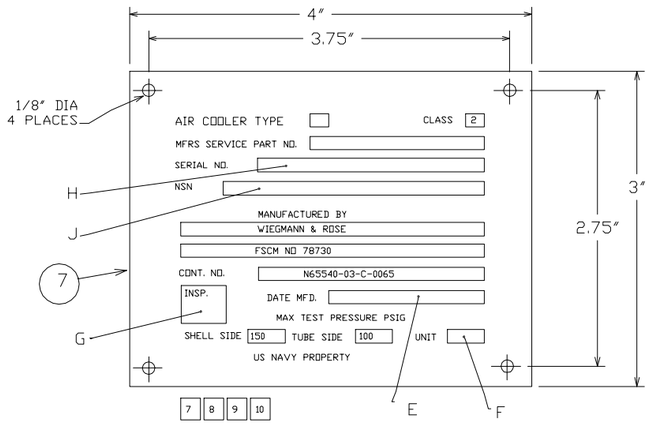


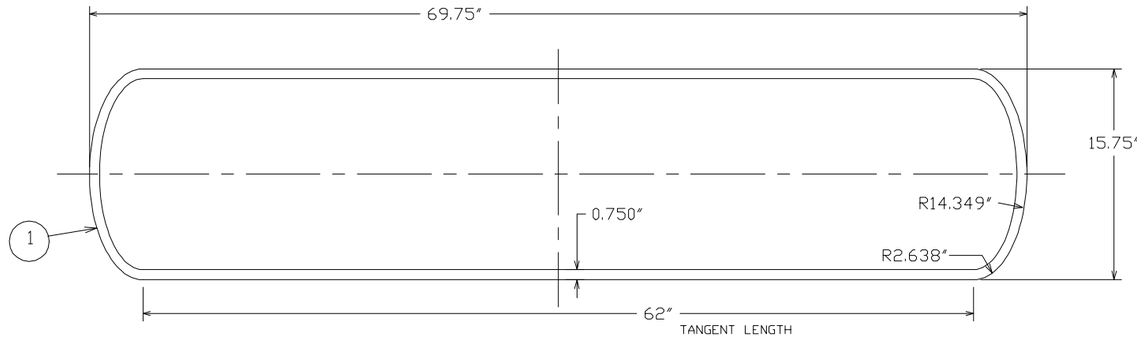
DETAIL 3



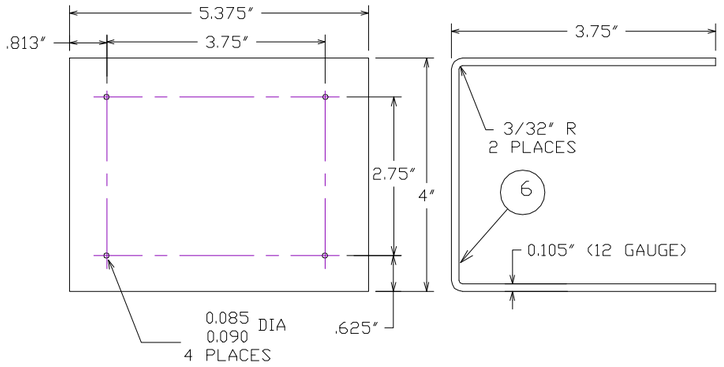


TYPICAL BOLTING





GASKET



		FIND NO.	QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	DESCRIPTION	MATERIAL	SPECIFICATION	WGT
		1	2	78730	GASKET	GARLOCK STYLE 601 CORRAGRAPH, 1/8" THK, 3/4" WIDE	MONEL CORE, GRAPHITE FACING	-	-
5	3	2	62	78730	STUD	5/8"-11 UNC-2A x 5.25" LONG	MONEL [4]	QQ-N-281(A)	-
6	3	3	124	78730	NUT	5/8"-11 UNC-2B HEX FINISHED	MONEL [4]	QQ-N-281(B)	-
		4	2	78730	DOWEL PIN	3/4" DIA, 2.375" LONG	CRES	T304	-
		5	2	78730	DOWEL PIN	3/4" DIA, 2.375" LONG	CRES	T304	-
		6	1	78730	N.P. BRACKET	#12 GA	70/30 CU NI	-	-
		7	1	78730	NAME PLATE	#18 GA	BRASS	QQ-B-613	-

PARTS LIST

NOTES: UNLESS OTHERWISE SPECIFIED
1. INTERPRET DRAWINGS IN ACCORDANCE WITH DOD-STD-100.
2. MATERIAL: SEE PARTS LIST.
[3] FABRICATE IN ACCORDANCE WITH MIL-S-1222.
[4] NI CU, HOT FINISHED
[5] THREAD DIMENSIONS AND TOLERANCES PER ANSI B1.1.
[6] THREAD DIMENSIONS AND TOLERANCES PER ANSI B1.2.
[7] FABRICATE PER MIL P 15024C TYPE A SIZE 9.
[8] ETCH LETTERS AND CHARACTERS FILLED WITH BLACK HARD PAINT ENAMEL OR LACQUER, COVER FACE OF PLATE WITH MOISTURE RESISTANT VARNISH.
[9] LETTERS AND CHARACTERS SHALL NOT BE LESS THAN 0.003" DEEP.
[10] VARIABLE DATA E, F, G, H, AND J TO BE HAND STAMPED OR ENGRAVED PER MANUFACTURING RECOREDS PRIOR TO IDENTIFICATION PLATE ATTACHMENT TO NEXT ASSEMBLY.

TOLERANCE FOR DIMENSIONS EXCEPT FINISHED SURFACES HOLE PATTERNS
FRACTIONAL: ±1/8
ANGULAR : ±1/2°

CONTRACT NO.
N65540-03-C-0065

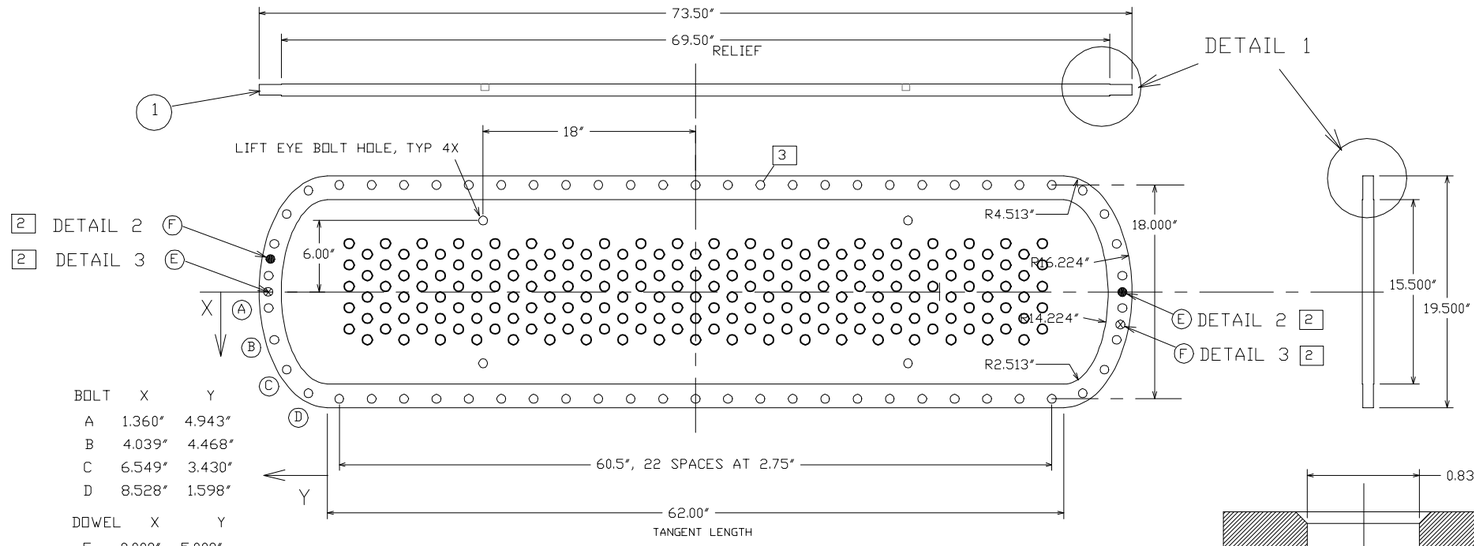
APPROVALS	DATE
J E LOGAN	5/26/04
DO NOT SCALE DWG	

WIEGMANN & NOBE

425 kW MOND-HEIGHT HEAT PIPE
HOT GAS TO WATER HEAT EXCHANGER
GASKET, BOLTING & IDENTIFICATION PLATE

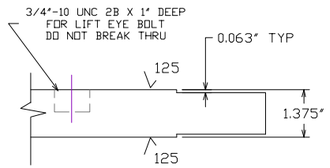
SIZE	CODE IDENT NO.	DWG NO.	REV
C	78730	D2800	-
SCALE NONE		SHEET 1 OF 1	

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

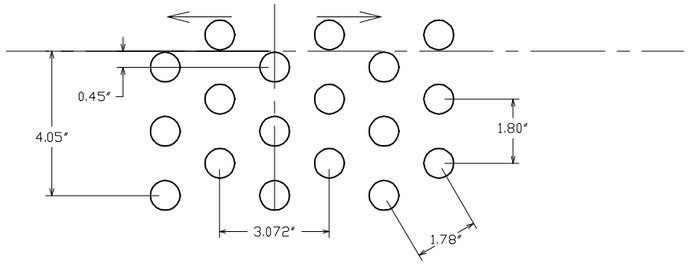


BOLT	X	Y
A	1.360″	4.943″
B	4.039″	4.468″
C	6.549″	3.430″
D	8.528″	1.598″

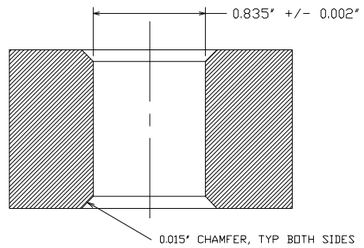
DOWEL	X	Y
E	0.000″	5.000″
F	2.706″	4.762″



DETAIL 1
TYPICAL FLANGE RELIEF



HEAT TUBE HOLE PATTERN



HEAT TUBE HOLE, TYP 195x

NOTES: UNLESS OTHERWISE SPECIFIED
1. INTERPRET DRAWINGS IN ACCORDANCE WITH DOD-STD-100.
2. REFER TO DRAWING D2800 FOR DOWEL PIN DETAILS.
3. BOLT HOLES ARE 0.750″ DIA.
4. MATERIAL: SEE PARTS LIST.
5. MAINTAIN FLAT SEALING SURFACES AFTER INSTALLATION OF THERMOSYPHONS.

FIND NO.	QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	DESCRIPTION	MATERIAL	SPECIFICATION	WGT
1	1	78730	D2799	TUBE SHEET	C-71500 70/30 CU NI	B-171	845

PARTS LIST

TOLERANCE FOR DIMENSIONS EXCEPT FINISHED SURFACES HOLE PATTERNS
FRACTIONAL: ±1/8
ANGULAR : ±1/2°

CONTRACT NO. N65540-03-C-0065

APPROVALS	DATE
J E LOGAN	5/26/04

DO NOT SCALE DWG

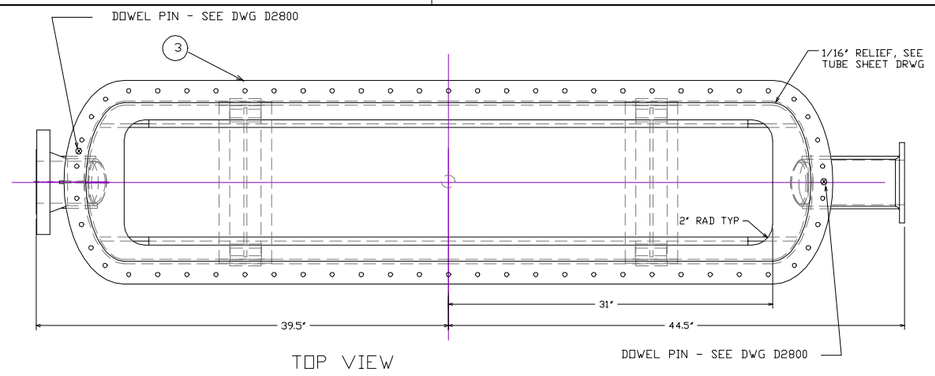
WESTINGHOUSE ELECTRIC CORPORATION
PITTSBURGH PENNSYLVANIA

425 kW MOND-HEIGHT HEAT PIPE
HOT GAS TO WATER HEAT EXCHANGER
TUBE SHEET

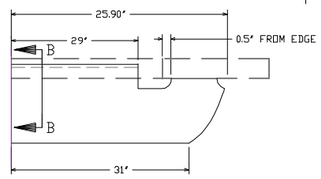
SIZE	CODE IDENT NO.	DWG NO.	REV
C	78730	D2799	–

SCALE NONE SHEET 1 OF 1

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

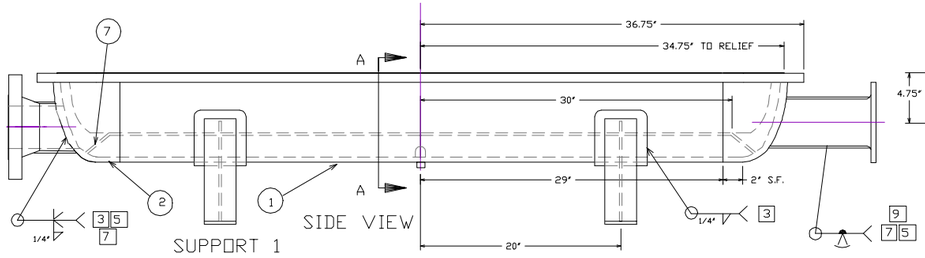


TOP VIEW



BAFFLE END DETAIL

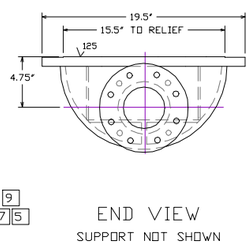
0.5" RADIUS, TYP



SUPPORT 1

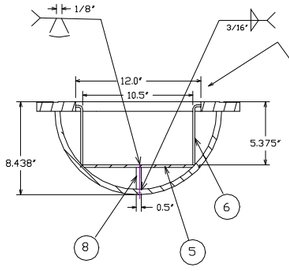
SIDE VIEW

SUPPORT 2

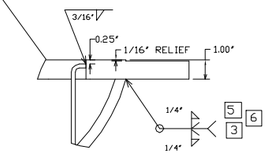


END VIEW

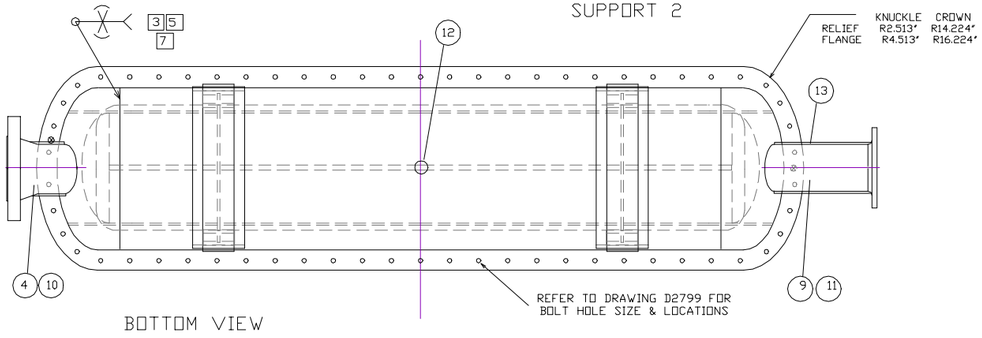
SUPPORT NOT SHOWN



SECTION A-A



SECTION B-B



BOTTOM VIEW

NOTES: UNLESS OTHERWISE SPECIFIED
1. INTERPRET DRAWINGS IN ACCORDANCE WITH DOD-STD-100.
2. BREAK ALL SHARP CORNERS AND EDGES 0.030" TO 0.050"
3. WELD PER WIEGMANN & ROSE WELD PROCEDURE NO. 16 SMAW OR NO. 197 GTAW, HIGH ALLOY STEEL TO HIGH ALLOY STEEL AND FABRICATE IN ACCORDANCE WITH MIL-STD-278F, CLASS A-2.
4. MATERIAL: SEE PARTS LIST.
5. LIQUID PENETRANT INSPECT THE ROOT PASS AND FINISHED WELD PER MIL-STD-271 AND MIL-STD-278.
6. ULTRASONIC EXAMINATION COMPLETED WELD PER MIL-STD-271 AND MIL-STD-278.
7. RADIOGRAPH COMPLETED WELD PER MIL-STD-271 AND MIL-STD-278.
8. CORROSION TESTED PER MIL-P-1144.
9. WELD PER WIEGMANN & ROSE WELD PROCEDURE NO. 197 GTAW, OPEN ROOT AND THEN WELD PROCEDURE NO. 233 FCAW COVER PASSES HIGH ALLOY STEEL TO HIGH ALLOY STEEL AND FABRICATE IN ACCORDANCE WITH MIL-STD-278F, CLASS A-2.
10. ALL PRESSURE BOUNDARY WELDS SHALL CONTAIN AT LEAST TWO WELD LAYERS. PRESSURE BOUNDARY GROOVE WELDS SHALL BE FULL PENETRATION.

FIND NO.	QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	DESCRIPTION	MATERIAL	SPECIFICATION	WGT
	1	78730	D2798	LOWER SHELL ASSEMBLY	CRES 304SS	-	675
8	1	1	78730	SHELL	1/2" THICK X 16" OD	304SS	A312	-
	2	2	78730	HEAD	16" OD X 5/8" MIN THICK 2:1 SE	304SS	A240	-
	3	1	78730	FLANGE	1" THICK	304SS	A240	-
	4	1	78730	FLANGE	4"-300#, RAISED FACE ASME B16.5	304SS	A182	-
	5	1	78730	TOP BAFFLE	3/16" THICK	304SS	A240	-
	6	2	78730	SIDE BAFFLE	3/16" THICK	304SS	A240	-
	7	2	78730	BTM, END CLOSURE BAFFLE	3/16" THICK	304SS	A240	-
	8	1	78730	STIFFENER	1/2" THICK	304SS	A240	-
	9	1	78730	FLANGE	4"-150#, FLAT FACE MIL-F-20042, FIG. 2	304SS	A182	-
8	10	1	78730	NOZZLE	4" NPS SCH 10S PIPE	304SS	A312	-
8	11	1	78730	NOZZLE	4" NPS SCH 10S PIPE	304SS	A312	-
	12	1	78730	DRAIN BOSS	7/8"-14UNF-2B	CRES 304	MS16142	-
	13	8	78730	NOZZLE STIFFENER	5/8" DIA BAR	CRES 304		-

PARTS LIST

TOLERANCE FOR DIMENSIONS EXCEPT FINISHED SURFACES HOLE PATTERNS

FRACTIONAL: ±1/8

ANGULAR : ±1/2°

CONTRACT NO. N65540-03-C-0065

APPROVALS	DATE
J E LOGAN	5/26/04

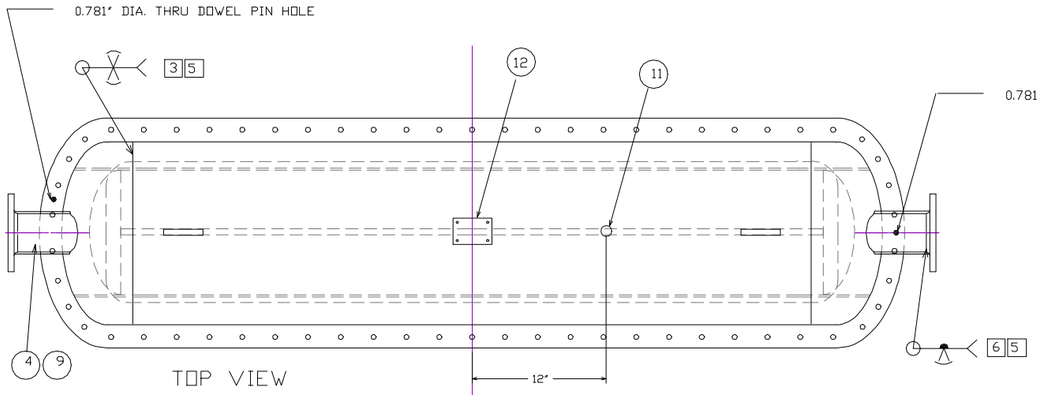
DO NOT SCALE DWG

WIEGMANN & ROSE

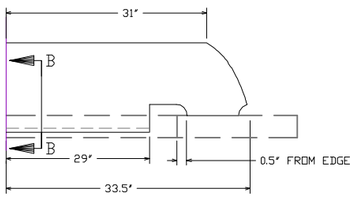
425 kW MOND-HEIGHT HEAT PIPE
HOT GAS TO WATER HEAT EXCHANGER
LOWER SHELL ASSEMBLY, AIR SIDE

SIZE	CODE IDENT NO.	DWG NO.	REV
C	78730	D2798	-
SCALE	NONE		SHEET 1 OF 1

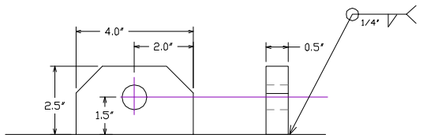
REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



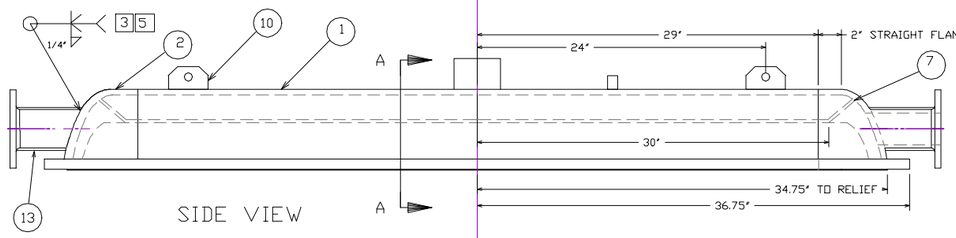
TOP VIEW



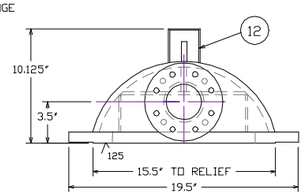
BAFFLE END DETAIL
0.5" RADIUS, TYP



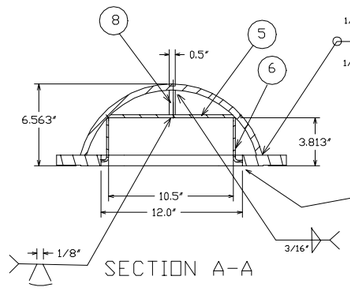
DETAIL 1
13/16" DIA HOLE,
0.5" CHAMFER



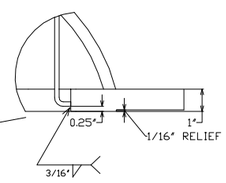
SIDE VIEW



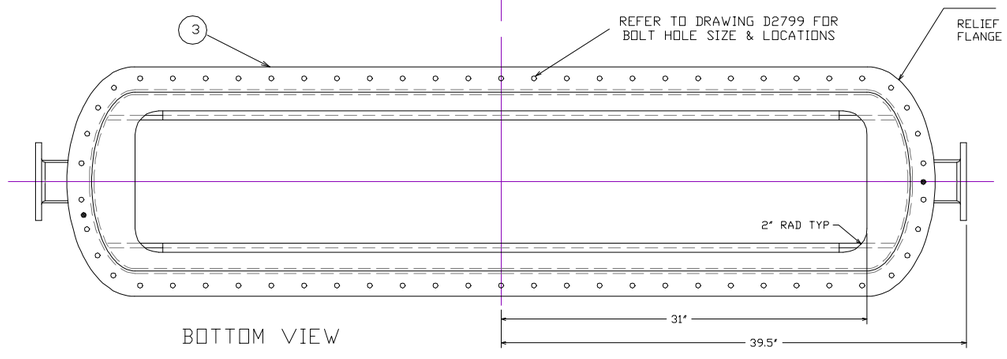
END VIEW



SECTION A-A



SECTION B-B



BOTTOM VIEW

FIND NO.	QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	DESCRIPTION	MATERIAL	SPECIFICATION	WGT
	1	78730	D2797	UPPER SHELL ASSEMBLY			480
1	1	78730	SHELL	1/2" THICK X 16" OD	C-71500 70/30 CU NI	B-171	-
2	2	78730	HEAD	16" OD X 1/2" MIN. THICK 2:1 SE	C-71500 70/30 CU NI	B-171	-
3	1	78730	FLANGE	1" THICK	C-71500 70/30 CU NI	B-171	-
4	2	78730	FLANGE	3"-150#, FLAT FACE MIL-F-20042, FIG. 2	C-71500 70/30 CU NI	FORGED	-
5	2	78730	TOP BAFFLE	3/16" THICK	C-71500 70/30 CU NI	B-171	-
6	2	78730	SIDE BAFFLE	3/16" THICK	C-71500 70/30 CU NI	B-171	-
7	2	78730	TOP, END CLOSURE BAFFLE	3/16" THICK	C-71500 70/30 CU NI	B-171	-
8	1	78730	STIFFENER	1/2" THICK	C-71500 70/30 CU NI	B-171	-
9	2	78730	NOZZLE	3" NPS X 0.25" WALL	C-71500 70/30 CU NI	B-171	-
10	2	78730	LIFT LUG	1/2" THICK	C-71500 70/30 CU NI	B-171	-
11	1	78730	VENT BOSS	7/8"-14UNF-2B	C-71500 70/30 CU NI	MS16142	-
12	1	78730	NAME PLATE	#18 GA	BRASS	QQ-B-613	-
13	8	78730	NOZZLE STIFFENERS	5/8" DIA BAR	C-71500 70/30 CU NI		-

PARTS LIST

NOTES: UNLESS OTHERWISE SPECIFIED
1. INTERPRET DRAWINGS IN ACCORDANCE WITH DOD-STD-100.
2. BREAK ALL SHARP CORNERS AND EDGES 0.030" TO 0.050"
3. WELD PER WIEGMANN & ROSE WELD PROCEDURE NO. 166 GTAW, CU NI ALLOY TO CU NI ALLOY AND FABRICATE IN ACCORDANCE WITH MIL-STD-278F, CLASS A-4.
4. MATERIAL: SEE PARTS LIST.
5. LIQUID PENETRANT INSPECT THE ROOT PASS AND FINISHED WELD PER MIL-STD-271 AND MIL-STD-278.
6. WELD PER WIEGMANN & ROSE WELD PROCEDURE NO. 169 GTAW, OPEN ROOT CU NI ALLOY TO CU NI ALLOY AND FABRICATE IN ACCORDANCE WITH MIL-STD-278F, CLASS A-4.

TOLERANCE FOR DIMENSIONS EXCEPT FINISHED SURFACES HOLE PATTERNS

FRACTIONAL: ±1/8

ANGULAR : ±1/2°

CONTRACT NO.
N65540-03-C-0065

APPROVALS	DATE
J E LOGAN	5/26/04
DO NOT SCALE DWG	

WIEGMANN & ROSE

425 kW MONO-HEIGHT HEAT PIPE
HOT GAS TO WATER HEAT EXCHANGER
UPPER SHELL ASSEMBLY, SEA WATER SIDE

SIZE	CODE IDENT NO.	DWG NO.	REV
C	78730	D2797	-
SCALE	NONE		SHEET 1 OF 1